



ARCADIS
10559 Citation Drive
Suite 100
Brighton
Michigan 48116
Tel 810.229.8594
Fax 810.229.8837
www.arcadis-us.com

Mr. James Saric
Remedial Project Manager
USEPA Region 5
77 West Jackson Boulevard
Mail Code: SR-6J
Chicago, IL 60605-3507

ENVIRONMENT

Subject:

Allied Paper, Inc./Portage Creek/ Kalamazoo River Superfund Site
Area 3/Former Otsego Impoundment: Proposed Survey and Field Sampling Plan

Date:
October 2, 2012

Dear Mr. Saric:

Contact:
Michael J. Erickson

This letter presents a proposed survey and field sampling plan to collect soil and sediment samples in Area 3, the former Otsego Impoundment, for the purposes of completing a supplemental remedial investigation and feasibility study (SRI/FS) in the Area. This *Area 3/Former Otsego Impoundment Field Sampling Plan* (Area 3 Field Sampling Plan) was developed based on the preliminary sampling plan presented in the *Area 3/Former Otsego Impoundment Proposed Reconnaissance Plan and Preliminary Sampling Design* (Reconnaissance Plan; ARCADIS 2012b) approved by the United States Environmental Protection Agency (USEPA) on June 26, 2012. This Area 3 Field Sampling Plan describes modifications and refinements made to the preliminary sampling plan based on the information gathered during reconnaissance and incorporates comments received from USEPA and the Michigan Department of Environmental Quality (MDEQ) in a September 10th conference call.

Phone:
810-225-1924

Email:
michael.erickson@arcadis-us.com

Our ref:
B0064531.00500

The goal is to commence sampling in September 2012 and we appreciate USEPA and MDEQ working with us to achieve this schedule. A tentative start date of September 17th for field activities was communicated previously, although this is subject to postponement to obtain USEPA approval and to accommodate agency oversight staff, if necessary.

The sampling work proposed herein is part of work being done under the March 2012 *Area 3/Former Otsego Impoundment Supplemental Remedial Investigation/Feasibility Study Work Plan* (Area 3 SRI/FS Work Plan; ARCADIS 2012a) – approved by USEPA on May 10, 2012 – that describes survey activities and soil and sediment sampling designed to:

1. Document the current physical conditions of the Kalamazoo River and the river banks in Area 3 of the Allied Paper, Inc./Portage Creek/ Kalamazoo River Superfund Site (Site)
2. Supplement the current characterization of the nature and extent of polychlorinated biphenyl (PCB) concentrations¹ in sediments, river bank soils, and floodplain soils in Area 3
3. Support identification and screening of a range of potential approaches and technologies for remediation of Area 3

The Area 3 SRI/FS Work Plan (ARCADIS 2012a) identifies two investigative phases in Area 3, which lies between the Otsego City Dam and the former Otsego Dam (see Figures 1-a and 1-b), based on the iterative approach employed in Area 2 (Otsego City Impoundment). The Phase 1 activities were completed in June and July 2012 with agency oversight and included floodplain soil, sediment, and land use reconnaissance. Phase 2 will involve survey and supplemental soil and sediment sampling.

This Area 3 Field Sampling Plan summarizes Phase 1 reconnaissance activities and describes the proposed Phase 2 survey and soil and sediment sampling activities. The proposed Phase 2 sampling locations are selected based on the preliminary sampling strata identified in the Area 3 SRI/FS Work Plan (ARCADIS 2012a) that were revised following reconnaissance activities.

Field work will be performed under agency oversight by ARCADIS personnel familiar with the area and Site. Work will be performed consistent with the methods and protocols set forth in the Multi-Area guidance documents (Multi-Area Field Sampling Plan and Multi-Area Health and Safety Plan; ARCADIS BBL 2007a and b).

A summary of Phase 1 activities and components of proposed Phase 2 activities are provided in the following sections.

¹ A determination of whether characterization of any additional constituents is needed will be made separately in consultation with USEPA .

Area 3 Phase 1 Field Reconnaissance

Reconnaissance Activities

ARCADIS conducted field reconnaissance activities in Area 3 between June 25 and July 12, 2012 with agency oversight. As described in the Reconnaissance Plan (ARCADIS 2012b), ARCADIS conducted a preliminary study to sufficiently characterize floodplain soil strata in Area 3 (see Figures A-1a and A-1b in Attachment A) allowing a geomorphic-based soil sampling program that will provide results representative of specific strata. Soil reconnaissance activities included a site walk within the limits of the Area 3 Study Area boundary (see Figures A-1a and A-1b in Attachment A) to conduct visual assessment of vegetation types, topographic changes, land use, boundaries of previously identified strata, and collection of soil borings to inspect and describe soil types and characteristics. Reconnaissance of Kalamazoo River sediments in Area 3 included identification of sediment deposits, bank types, and collection and description of sediment cores.

During the week of June 25, reconnaissance activities were conducted at 19 sediment and 38 soil locations within Area 3. Additionally, several locations on the north and south sides of the river were visually surveyed and photographed. Bank types identified on the north and south side of the river in Area 3 are summarized in Table A-1 and identified in Figures A-2a and A-2b (Attachment A). Locations for collection of sediment cores were identified by the field crews based on the probing data and sediment characteristics observed in the field. Attachment A presents reconnaissance information collected in the field – reconnaissance core locations are presented in Figures A-1a and A-1b, bank types are identified in Figures A-2a and A-2b, and field data collected during this effort are summarized in Tables A-1 through A-5.

Additionally, on June 29 and July 11, 10 sediment cores were collected within the Pine Creek Study Area boundary, the locations for which were selected in collaboration with agency oversight (see Figures A-1a and A-1b in Attachment A). These cores were described and segmented and then archived for future analysis on July 12. A total of 67 samples were collected for potential PCB analysis and a surface sample (0 to 2 inch interval) from each core was collected for potential total organic carbon (TOC) analysis. All samples were placed in jars, labeled, and retained temporarily in frozen storage. The specific samples proposed for PCB analysis are described in this Area 3 Field Sampling Plan. Data associated with Pine Creek sediment cores are provided in Tables A-3, A-5, and A-6 (Attachment A).

During reconnaissance activities, the presence or absence of grey materials and fine-grained sediments in addition to floodplain characteristics, general land use, and other physical characteristics were observed and recorded. The data collected during reconnaissance activities were used to evaluate, confirm, and/or refine the Study Area boundary, the preliminary floodplain soil strata boundaries, and preliminary sample locations identified in the Area 3 SRI/FS Work Plan (ARCADIS 2012a).

Key Reconnaissance Observations

- Coarse-grained and rocky materials are the primary materials observed upstream of the M-89 Bridge, where the water tends to be shallow and faster flowing than in the downstream impounded area. Little sediment accumulation has occurred in this upper portion of Area 3 and based on the existing PCB data, additional characterization is unwarranted. Previous remedial investigation sampling attempts in this reach have resulted in a number of planned cores being uncollectable due to lack of sediment, and where sediment was obtained, materials are predominantly coarse grained and have low PCB concentrations.
- Grey clay materials were observed at depths of up to 4.7 feet in a small area at the downstream end of the now-filled historic channel that bypassed the dam spillway and discharged between the Farmer Street Bridge and the Otsego City Dam. Samples are proposed in this area as described in the discussion of proposed Phase 2 activities.
- Downstream of the M-89 Bridge, extensive sediment deposits are present, in particular along both banks, and were found at depths up to 7 feet. Fine-grained sediments appear to be nearly continuous along the banks in this reach.
- A review of bank characteristics was conducted as part of the reconnaissance activities and nine bank types were identified within Area 3 (Table A-1 and Figures A-2a and A-2b in Attachment A). Bank types ranged from low vertical vegetated or rock-covered to steep but vegetated high banks. A number of residential properties, primarily located some distance upstream of the M-89 Bridge, were identified with mowed lawns extending to the top-of-bank. In some instances, gray materials were identified in the bank face, as in other bank areas in this reach.
- An approximately 100-foot long sheetpile bulkhead wall is present on the north bank slightly downstream of the Cogswell Property (previously the Rock Tenn

facility - see Figure A-2b in Attachment A) and several intake and outfall features are also present along the shoreline. Grey materials were observed on the opposite bank and downstream from this property.

- Observations made during the floodplain reconnaissance were generally consistent with the anticipated conditions. Fine-grained grey materials were identified in the cores collected within the former impoundment boundary downstream of the M-89 Bridge. Similar materials were also identified close to the river in the floodplain area on the south side of the river upstream of the M-89 Bridge, although these materials did not appear to extend back to the Study Area boundary in this area. In the Previous Channel 03 on the north side of the Kalamazoo River downstream of the Pine Creek outfall, a garden which had been identified by MDEQ a number of years ago was no longer present; no evidence of any gardening activity was observed.

Revisions to the Geomorphic Strata based on Reconnaissance

- During reconnaissance activities, a Terrace area was identified on the north side of ORFP-06. Therefore, the strata boundary of Terrace 3 was extended to cover the remaining portion of the Terrace area near ORFP-06 (see Figure A-1a in Attachment A).
- The strata boundary of Terrace 4 was revised to follow an elevation of 692 feet (NGVD 29) (see Figure A-1a in Attachment A).
- The Terrace (previously Terrace 5) area on the south side of Previous Channel 03 was identified as Previous Channel and therefore, it was combined with Previous Channel 03 and the terrace numbering was revised (see Figure A-1a in Attachment A).
- A channel separating Previous Channel and Terrace areas, northeast of Pine Creek, was identified between ORFP-20 and ORFP-21 and therefore, strata boundary of Previous Channel 08 was extended into Terrace 5 (see Figure A-1a in Attachment A).
- The strata boundary of Previous Channel 09 was moved closer to the river to follow the top of the berm (see Figure A-1b in Attachment A).

Adjustments to the Study Area Boundary based on Reconnaissance

As described in the Area 3 SRI/FS Work Plan (ARCADIS 2012a), the Study Area boundary was derived from the outer extent of the Federal Emergency Management Agency (FEMA) 100-year floodplain boundary, 683-foot (NGVD 29) contour, and the approximate extent of visually identified impounded areas from historical aerial photographs. The Study Area boundary was revised in certain locations based on the key features identified during field reconnaissance activities (see Figure A-3 in Attachment A).

- The Study Area boundary at Terrace 4 was adjusted to follow an elevation of 692 feet (NGVD 29) (see Figure A-1a in Attachment A).
- The Study Area boundary on the north side of the river was revised to follow an elevation of 690 feet (NGVD 29) on the top of the berm between M-89 Bridge and Previous Channel 10 (see Figure A-1b in Attachment A).
- On the south side of the river, the Study Area boundary between Previous Channel 09 (immediately upstream of the M-89 Bridge) and the Wastewater Treatment Plant was revised to follow the top of the berm from ORFP-30 to ORFP-33. The Study Area boundary was also extended to cover the floodplain area on the south side of the bank between ORFP-33 and the Wastewater Treatment Plant (see Figure A-1b in Attachment A).
- The Study Area boundary on the west side of the Cogswell Property (see Figure 1b for Cogswell parcel location) was moved closer to the river to follow an elevation of 696 feet (NGVD 29) on the berm behind ORBN-06 (see Figure A-1b in Attachment A).
- The north bank immediately downstream of Farmer Street Bridge (ORBN-31 to ORBN-32) is a high bank and therefore, the Study Area boundary was moved to be closer to the river (ORBN-30 to ORBN-32) (see Figure A-1b in Attachment A).

Area 3 Phase 2 Field Sampling Activities

This Area 3 Field Sampling Plan proposes the following activities to fulfill the objectives stated in the Area 3 SRI/FS Work Plan (ARCADIS 2012a):

- Surveying river channel transects throughout Area 3 with probing/coring of sediments at select transect locations using Lexan® tubes to collect supplemental data on sediment thickness and sediment types at sixteen new transects across the river and one previously surveyed United States Geological Society (USGS) transect (USGS Transect No. 1) (See Figures 2-a through 2-d for proposed sediment probing and sampling transect locations and Figures 3-a through 3-d for proposed sediment survey transect locations). These transects will provide an estimated 429 samples for PCB analysis to be selected from the Lexan® core samples obtained (see Note 3 of Table 1).
- Bank profile surveying at sediment transect locations with top-of-bank sampling at select probing/coring transects and in select additional floodplain areas to provide additional information on bank characteristics within Area 3 (Figures 4-a through 4-d).
- Depending on results of the supplemental sediment transect sampling, when evaluated in conjunction with the sampling results from the 2011 sediment investigation by Weyerhaeuser², additional main channel sediment sampling may be conducted at randomly selected locations (up to seven cores) within the formerly impounded portion of Area 3 at locations between existing and the new PCB sampling transects to supplement the characterization of main channel sediments upstream of the Otsego Dam to the M-89 Bridge. Figures 2-a and 2-b show tentative locations for these cores, which would provide an estimated 45 additional samples for PCB analysis; however, the locations will be reviewed and a determination of whether or not these cores are actually needed (or whether the locations are appropriate) will be made in collaboration with USEPA and MDEQ. If required, those additional samples will be collected in a second phase of sampling in early 2013.
- Supplemental water level readings, especially at high flow conditions to support hydrodynamic modeling and to establish flood level elevations (flood elevations are not available from FEMA for Area 3; the model will support evaluations to be conducted in the Feasibility Study).

² Draft results have been made available; however, at this point, a final report on the sediment investigation by Weyerhaeuser in Area 3 has not yet been received.

- Revisiting established erosion pin survey locations to collect updated bank profile surveys to evaluate erosion rates since the last erosion pin surveys were conducted in 2002 (Figures 4-a through 4-d).
- Floodplain soil sampling within the identified geomorphic strata, with refinement of the boundaries based on the reconnaissance, as described above (Figures 4-a through 4-d).
- Analysis of a subset of the Pine Creek sediment core samples collected during Phase 1 to characterize sediments in the Pine Creek Impoundment.

All of the bank and soil samples submitted for laboratory analysis will be analyzed for PCBs. All of the surface samples will be analyzed for grain size and TOC.

The preliminary sampling design presented in the Reconnaissance Plan (ARCADIS 2012b) included a total of 50 sediment and 90 soil sample locations (16 bank and 74 floodplain soil). Several of the proposed locations warranted modification based on the reconnaissance findings. The modified plan includes a total of 68 sediment sampling locations and 118 soil sampling locations (39 bank and 79 floodplain soil). Details of the plan and modifications to the preliminary sampling design are described below.

Proposed Top of Bank and Floodplain Soil Sampling

Bank Soil Sampling

At each end of 19 of the 29 transects that will be established, a top-of-bank soil core will be collected for laboratory analysis. Exceptions include at Transect ORT-18, where only one bank sample will be collected from the north side and Transect ORT-22, where one bank sample will be collected from the south side of the transect due to the high elevation and steep nature of the banks. Three additional bank samples will be collected from the south bank upstream of M-89 Bridge to better characterize the floodplain bank in this area (See Figure 4-c). This will result in collection of 39 top-of-bank cores (33 top-of-bank cores are located within the former Otsego Impoundment). Bank soil samples will be collected from the top-of-bank (or within 30 feet of the edge of water if there is no defined top-of-bank) to refusal at the locations shown on Figures 4-a through 4-d to characterize the nature and extent of PCBs in bank soils and to supplement data used to estimate PCB loading from bank erosion. Surface samples will also be analyzed for TOC and particle size distribution.

Floodplain Soil Sampling

Floodplain sample locations have been established within geomorphic strata preliminarily defined in the Reconnaissance Plan (ARCADIS 2012b), which were refined based on reconnaissance information as described above. In addition to those refinements, the proposed floodplain soil sample locations were adjusted from those presented in the Reconnaissance Plan (ARCADIS 2012b). A list of the adjustments, which include repositioning of some samples, removal of some samples, and addition of others is described in the list below. As a result of these adjustments, the number of proposed floodplain soil sample locations is 79 as shown on Figures 4-a through 4-d. Table 2 provides a summary of existing and proposed floodplain sample densities on a stratum and unit-by-unit basis within Area 3.

The existing samples and the proposed top-of-bank and floodplain samples together will provide a total of 118 soil sample locations in Area 3 (Table 1).

Reconnaissance will be conducted on the island located just downstream of the Otsego City Dam and if warranted based on field observations, soil samples will be collected at up to three locations. The locations for these samples will be determined in the field in consultation with agency field oversight personnel.

Sampling will not be performed within the filled in footprint of the old raceway channel on the south side of the river downstream of the Otsego City Dam, which is now occupied by parking lots, structures, and a park (Previous Channel 11). Available information on the history of the raceway will be compiled and included in the Area 3 SRI Report.

All soil samples will be analyzed for PCB Aroclors. Additionally, all surface soil samples will be analyzed for TOC and particle size distribution.

Soil sample location adjustments from preliminary sampling design based on reconnaissance information include:

- Two bank soil samples OTBN-05 and OTBS-05 (previously OTBN-04 and OTBS-04, which were located on a high bank) were moved slightly downstream along with sediment transect ORT-05 (previously ORT-04) (see Figure 4-a).
- Soil samples OFP-010 (Previous Channel 02) and OFP-011 (Previous Channel 03) were moved further away from the top-of-bank (see Figure 4-a).

- After updating the Study Area and strata boundaries of Terrace 4, soil sample OFP-012 fell outside the boundary and therefore, this sample was moved closer to the river in Terrace 4 (see Figure 4-a).
- Soil sample OFP-36 (previously OFP-039) was moved north to be within Michigan Department of Natural Resources (MDNR) property (see Figure 4-b).
- Soil sample OFP-43 (previously OFP-46) in Previous Channel 03 was moved slightly west on the MDNR property (see Figure 4-b).
- Two bank samples OTBN-11 and OTBS-11 (previously OTBN-09 and OTBS-09) were moved with transect ORT-11 (previously transect ORT-09) (see Figure 4-b).
- Two bank samples OTBN-20 and OTBS-20 (previously OTBN-17 and OTBS-17) were moved from ORT-21 (previously ORT-17) to coincide with probing transect ORT-20 (previously transect ORT-16) (see Figure 4-b).
- Two bank samples, OTBN-24 and OTBS-24 (previously OTBN-19 and OTBS-19), were moved with transect ORT-24 (previously transect ORT-19) due to the proximity of the Cogswell property (where multiple outfalls and high banks were identified) on the north bank and private residential property on the south bank.

Soil sample locations eliminated from preliminary sampling design based on reconnaissance information include:

- Previous soil sample OFP-030 was eliminated as it fell outside Previous Channel 05 on a steep bank within private property.
- One soil sample (previously OFP-67) between Terrace 7 and Previous Channel 08 was eliminated from the top of the berm (approximately 10 feet high).
- Bank sample OTBN-22 (previously OTBN-18) located on the north side of the river immediately upstream of Previous Channel 09 was eliminated from the high bank (see Figure 4-c).
- Three soil samples (previously OFP-22, OFP-27, and OFP-31) were determined to be on a former peninsula where impact is not expected due to high elevation.

These samples were eliminated and samples in this area will only be collected if grey materials are observed.

Soil sample locations added to the preliminary sampling design based on reconnaissance information include:

- One new soil sample (OFP-17) was added in Previous Channel 03 (south side of OFP-16) to gather additional data from the garden area where a high PCB concentration was measured in a MDEQ soil sample (see Figure 4-a).
- Soil sample OFP-69 was added in Previous Channel 09 to increase the sample density in this feature.
- Five new soil samples (OFP-70, OFP-71, OFP-73, OFP-78 and OFP-79) were added in the extended floodplain area adjacent to Previous Channel 09 (MDNR Property) below the 683-foot elevation and one new soil sample (OFP-72) was added above the 683-foot elevation to gather additional data from this area (see Figure 4-c).
- Three new bank samples (OTBS-30 through OTBS-32) were added on the south bank between Previous Channel 09 and the Wastewater Treatment Plant (see Figure 4-c).
- Two new soil samples (OFP-76 and OFP-77) were added in Previous Channel 11 (immediately downstream of the Farmer Street Bridge) where grey fine sediments/soils were observed on the downstream end of the feature at up to 4.7 feet deep during reconnaissance activities (see Figure 4-d).

Proposed Sediment Probing and Sampling Along Transects

Supplemental sediment probing transects will be established at 16 locations in the Kalamazoo River upstream of the Otsego Dam (see Figure 3-a through 3-c). Along with these 16 transects, one transect previously established by USGS (USGS Transect No. 1) will be probed and sampled to further characterize sediments in the downstream area near the Otsego Dam. These transects will be positioned approximately at the mid-point between existing PCB sampling transects to essentially double the spatial resolution of the available transect sampling data. Figures 2-a through 2-d show the locations of proposed supplemental sampling transects as well as transects previously sampled by ARCADIS in 1993 and 1994.

Transects OCRT-45 through OCRT-48 (surveyed and cored as part of the Area 2 investigation in 2010 between the Otsego City Dam and the Farmer Street Bridge) and transects KPT-83 and KPT-84 (surveyed and cored by ARCADIS in 1993 and 1994) are shown on Figure 3-c and 3-d. Transects will be probed with Lexan® core tubes between the river banks, and measurements of water depth and sediment thickness will be recorded, along with a description of the sediments. Probing cores will be collected at 5-foot intervals up to 10 feet from each bank to provide additional characterization of near bank sediments, and within the central portion of each transect for a total of approximately 8 to 10 cores per transect.

Sediment samples will also be collected from the probing cores obtained, and up to four cores per transect (fewer cores may be selected on some transects depending on the distribution of fine and coarse sediments at each transect) will be selected for PCB analysis for a total of approximately 68 sediment core locations. Approximately 75 percent of the cores selected for analysis will be from cores with predominantly fine-grained sediments and the remainder will be from cores classified as representing coarse-grained sediments. Samples will be selected for PCB analysis during processing activities in the field office in consultation with agency oversight personnel and submitted to the laboratory for analysis of PCB Aroclors. Surface samples from each location will be analyzed for TOC and particle size distribution. Cores selected for PCB analysis will include at least one near-bank (i.e., within 10 feet of the bank) location from each side of the river (anticipated to be predominantly fine materials) and two mid-channel location from each transect (where coarser grained sediments are expected).

Changes in Preliminary Sediment Probing and Sample locations based on Reconnaissance

Revisions to the preliminary sediment sampling design include additional probing/coring at four survey transects in the downstream portion of the impoundment and relocation of two probing/coring transects. These revisions are further described below.

- Transects ORT-01 and ORT-08 (previously ORT-06), located between the Otsego Dam and Pine Creek, were changed from survey only transects to probing/coring transects, and ORT-08 was moved approximately 50 feet upstream (see Figures 2-a and 3-a).

- Four supplemental probing/coring transects (ORT-03, ORT-07, ORT-16 and ORT-18) were added between the M-89 Bridge and the Otsego Dam to gather additional sediment data within the former impoundment.
- One supplemental probing/coring transect (ORT-06, previously ORT-04) was moved slightly downstream to avoid the collection of a north bank sample (OTBN-06, previously OTBN-04) on a high bank (see Figure 2-a).
- One supplemental probing/coring transect ORT-11 (previously ORT-09) was moved downstream of the Pine Creek outlet (see Figure 2-b).
- Survey transect ORT-20 (previously ORT-16) was changed from survey only transect to probing/coring transect.
- Probing transect ORT-21 (previously ORT-17) was changed from probing/coring transect to survey only transect.
- One supplemental probing/coring transect ORT-23 was added mid-way between previous 1993/94 transects KPT-84 and KPT-85, per request by MDEQ. It is noted that bed materials in this location may be coarse and it therefore may not be feasible to collect cores across the entire transect.
- One supplemental probing/coring transect ORT-24 (previously ORT-19) was moved to Previous Channel 10 (see Figure 2-c) due to the proximity of the Cogswell property (where multiple outfalls and high banks were identified).
- One supplemental probing/coring transect ORT-25 was added mid-way between previous 1993/94 transects KPT-82 and KPT-83, per request by MDEQ. It is noted that bed materials in this location may be coarse and it therefore may not be feasible to collect cores across the entire transect.
- One supplemental probing/coring transect ORT-26 was added mid-way between previous 1993/94 transects KPT-81 and KPT-82, per request by MDEQ. It is noted that bed materials in this location may be coarse and it therefore may not be feasible to collect cores across the entire transect.

Supplemental Sediment Sampling Between Transects

The Reconnaissance Plan (ARCADIS 2012b) allowed for collection of up to 20 additional sediment cores beyond those envisioned to be collected from the supplemental transects based on the results of the reconnaissance activities. Based on a finding from reconnaissance that fine-grained sediment is present nearly continuous along the banks downstream of the M-89 Bridge, it is anticipated that the systematic transect-based sampling program will adequately characterize these materials for purposes of the SRI/FS.

To assess whether there may be deposits of higher PCB concentration material in the main channel between transects in the lower portion of the impoundment, seven sediment cores may be collected from randomly selected locations between the Otsego Dam and transect KPT-92. These samples are randomly distributed within an offset of 75 feet upstream and downstream from existing and proposed new sediment transect samples and 30 feet from either bank (See Figures 2-a and 2-b). As described above, the locations will be reviewed along with the results of the transect sampling and sample data from the 2011 Weyerhaeuser sediment investigation in Area 3, and a determination of whether or not these cores are actually needed will be made in collaboration with USEPA and MDEQ. If required, those additional samples will be collected in a second phase of sampling in early 2013.

Pine Creek Sediment Cores for PCB Analysis

The reconnaissance activities included collection of 10 sediment probing cores from the Pine Creek Impoundment. These cores were described and processed for possible future analysis, and samples are currently archived in frozen storage. Six of these cores will be analyzed for PCBs. Figure A-1a and Tables A-3 and A-5 in Attachment A provide data on the cores collected during reconnaissance. The specific samples proposed for PCB analyses are highlighted in Table A-6 in Attachment A. This will provide a total of 45 sediment samples analyzed for PCB Aroclors from the Pine Creek Impoundment.

Proposed Survey Activities

In addition to supplemental sediment probing transects, a series of existing and new transect locations will be established for survey purposes only (i.e., transects will not be probed; see Figures 3-a through 3-d). Existing USGS transect Nos. 3, 5, 7, 9, 11,

and 12 will be resurveyed to assess changes in top of sediment elevations. New survey transects will also be placed immediately upstream and downstream of the M-89 Bridge, the North Street Bridge, and the Farmer Street Bridge for potential use in hydraulic modeling. In addition, major features of the Otsego Dam spillway and earthen berm will be surveyed. The spillway elevation of the Pine Creek Impoundment will also be surveyed, and the spillway weir dimensions measured.

Staff Gage Installation

Two staff gages will be installed in the impoundment, one at the Otsego Dam and one at the Lincoln Road Bridge. A previous staff gage located at the Farmer Street Bridge will also be re-established to provide readings in the upstream area of the impoundment (Figures 2-a through 2-d). The water elevation at the staff gages will be regularly monitored during field activities to capture a range of flows, and flows will be measured in conjunction with staff gage readings by recording flow velocities across the river at the Farmer Street Bridge and at the Otsego Dam to provide calibration data for modeling purposes.

Bank Profile Survey

Bank profiles will be surveyed to characterize the shape and conditions of the bank at each of the supplemental sediment transect locations. Additionally, updated profiles will be surveyed at locations last surveyed in 2000 to estimate soil erosion losses. The bank cross-sectional profile will be surveyed at a total of 26 transects on both the north and south bank for a total of 52 transects. Three additional cross-sectional profiles will be collected from the south bank upstream of M-89 Bridge in the locations of proposed additional bank sampling (See Figure 4-c). At a minimum, the top-of-bank, slope-of-bank, and toe-of-bank under the surface of the water will be surveyed. Grade changes and at least one point beyond the top-of-bank will also be surveyed to describe the profile in sufficient detail and to reflect the general topography of the floodplain adjacent to the bank. Survey on the landward side of the bank profile will extend approximately 30 feet from top-of-bank.

Updated Survey of Erosion Pin Transects

In 2000, erosion pins were installed along transects at 10 locations (five locations along the north banks and five matching locations along the south river banks – see Figures 3-a through 3-d) in the former Otsego Impoundment to measure changes in the bank over time and estimate the rate of erosion, where observed. Erosion pin

locations were re-surveyed twice a year through 2002 to document periodic changes in the bank that occurred during that time. Previous erosion pin survey locations will be re-established and surveyed in addition to the top-of-bank profile locations described above to update prior bank soil and PCB erosion rates presented in the 2003 Erosion Pin Monitoring Data Report (BBL 2003).

Sampling and Analysis Methods

Soil and sediment sampling will be performed in accordance with the methods described in the Multi-Area Field Sampling Plan (ARCADIS BBL 2007a), and consistent with the Area 3 SRI/FS Work Plan (ARCADIS 2012a). Floodplain coring aims to define the thickness of PCB-containing soils. As in the sampling conducted in Area 2, multiple core sections may be needed to accomplish this. For all core locations, the recovered core will be segmented and homogenized, and the samples split. Samples will be collected for analysis of PCB Aroclors, TOC, and particle size distribution from the appropriate intervals. All soil and sediment samples will be submitted to the laboratory for analysis of PCB Aroclors. The surface sample from each core will also be analyzed for TOC and particle size distribution.

PCB analysis will be conducted using the TestAmerica Laboratories, Inc. (TestAmerica) protocol for USEPA Method 8082 approved by USEPA in the Multi-Area Quality Assurance Project Plan (ARCADIS 2010). All sample handling and analysis will be performed in accordance with the Multi-Area Field Sampling Plan (ARCADIS BBL 2007a) and Multi-Area Quality Assurance Project Plan (ARCADIS 2010).

Summary of Proposed Field Sampling Program

A summary of the proposed sampling program in Area 3 is provided in Table 1.

Schedule

ARCADIS will schedule and initiate survey and sampling activities in collaboration with agency personnel following approval of this plan from USEPA and MDEQ. Surveying and field sampling activities are proposed to start during the week of September 17, 2012, subject to availability of agency oversight personnel, obtaining any access agreements, and river flow and weather conditions. Our goal is to complete all field work by mid-October 2012 and to receive laboratory results for

submitted samples by December 2012. Any remaining sampling needs will be identified after review of results.

Sincerely,

ARCADIS



Michael J. Erickson, P.E.
Vice President

Copies:

Paul Bucholtz, MDEQ
Jeff Keiser, CH2M HILL
Garry Griffith, P.E., Georgia-Pacific, LLC
Mark Brown, Ph.D., Waterviews, LLC

References:

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ARCADIS. 2012a. *Allied Paper, Inc./Portage Creek/ Kalamazoo River Superfund Site Area 3/Otsego Impoundment Supplemental Remedial Investigation/ Feasibility Study Work Plan*. March 2012.

ARCADIS. 2012b. *Area 3/Former Otsego Impoundment Proposed Reconnaissance Plan and Preliminary Sampling Design*. June 2012.

ARCADIS BBL. 2007a. *Allied Paper, Inc./Portage Creek/ Kalamazoo River Superfund Site Multi-Area Field Sampling Plan*. October 2007.

ARCADIS BBL. 2007b. *Allied Paper, Inc./Portage Creek/ Kalamazoo River Superfund Site Multi-Area Health and Safety Plan*. May 2007.

BBL. 2003. *Erosion Pin Monitoring Data Report*. March 2003

Enclosures:

Table 1	Summary of Proposed Survey and Sampling Activities
Table 2	Summary of Existing and Proposed Sample Densities by Strata
Figures 1a-b	Tax Parcels Related to Area 3
Figures 2a-d	Proposed Sediment Investigation for Area 3
Figure 3a-d	Proposed Survey Investigation for Area 3
Figures 4a-d	Proposed Bank and Floodplain Soil Investigation for Area 3
Attachment A	Data from Field Reconnaissance

Tables

Georgia-Pacific LLC
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Supplemental Remedial Investigations/Feasibility Studies
Area 3/Former Otsego Impoundment Proposed Survey and Field Sampling Plan

Table 1 - Summary of Proposed Survey and Sampling Activities

Field Activity	Description	Number of Locations	Location ID	Sample Intervals	Number of Samples	Analyses
Survey	Bank Profiles - Detailed bank profiles from past the top-of-bank to the bottom of the river, survey at both locations along south and north sides of the main channel of the river. Bank profiles will also be completed at three top-of-bank sample locations in the southern floodplain upstream of the M-89 bridge (OTBS-30 through OTBS-32)	61	OTBS-1 through OTBS-32 OTBN-1 through OTBN-29	NA	NA	NA
	River Transects - Establish 17 probing/coring transects within the Otsego Impoundment and probe sediment at up to 10 points along transect. Cores near bank will be located at 5 foot intervals to 10 feet from bank. Probing/coring transects will include 1 previous USGS transects. Establish 12 survey only transects. Of the survey only transects, 6 will be at previous USGS transects.	29	ORT-1 through ORT-29	NA	NA	NA
Soil Sampling ¹	Top-of-Bank Sampling - Collect a soil core at the top of the bank at selected bank profiles ² .	39	OTBS-1 through OTBS-32 OTBN-1 through OTBN-26	0- to 6-inch, 6- to 12-inch, 12- to 24-inch, 12-inch increments	205	PCB (all samples), particle size and TOC (surface only)
	Floodplain Sampling - floodplain soil samples will be collected from locations to spatially represent the different geomorphic strata and other specific floodplain feature between Otsego City Dam and Lincoln Road/M-89 Bridge (the former channel near the dam, the residential area of the floodplain).	79	OFP-01 through OFP-79	0- to 6-inch, 6- to 12-inch, 12- to 24-inch, 12 inch increments	415	PCB (all samples), particle size and TOC (surface only)
Sediment ³	Samples from 6 sediment cores collected from the Pine Creek Dam area during reconnaissance will be submitted for PCB analyses ⁴ .	6	OSD-01 through OSD-10	0- to 2-inch, 2- to 6-inch, 6- to 12-inch, 12- to 24-inch, 12 inch increments	45	PCB (all samples), TOC and particle size (surface only)
	Sediment Sampling - Approximately 4 sediment cores from 17 probing transects will be submitted for analysis. Approximately 75% of cores will be targeted in fine sediments and 25% in coarse sediments. Sample selections will include near bank (within 10 feet) and mid-channel locations ⁵ .	68	ORT-1-x through ORT-26-x	0- to 2-inch, 2- to 6-inch, 6- to 12-inch, 12- to 24-inch, 12 inch increments	429	PCB (all samples), TOC and particle size (surface only)
	An additional 7 randomized locations within the former impoundment may be performed in further phase of sampling ⁶ .	7	OSD-11 through OSD-17 (if needed)	0- to 2-inch, 2- to 6-inch, 6- to 12-inch, 12- to 24-inch, 12 inch increments	45	PCB (all samples), TOC and particle size (surface only)
Hydraulic Monitoring	Staff Gage - Establish 3 temporary staff gages. Monitor and record river stage over a range of flow conditions during other sampling activities.	3	OSG-1, OSG-2, OSG-3	NA	≥10	NA
	Flow measurements - Periodically measure flow at the staff gages over a range of flow conditions and water elevations.	3	OSG-1, OSG-2, OSG-3	NA	≥10	NA
Erosion Pin Survey	Previous erosion pin survey locations (originally surveyed in 2000) will be reoccupied, surveyed, and monitored on a seasonal basis to develop bank soil and PCB erosion rates for the 10-year intercedent period.	10	OEP-1 through OEP-5	NA	NA	NA

Notes:

- Bank and floodplain soil samples based on an average 5 samples per core (average depth of 48 inches) plus duplicates (1 duplicate sample per 20 samples).
- Bank samples will be collected at each end of 19 transect locations (except OTBS-18, where only a northern bank sample is proposed, and OTBN-22, where only a southern bank sample is proposed). The location ID will be consistent with the bank profile ID. An additional 3 bank samples will be collected on the southern bank upstream of M-89 and are not associated with sediment transects.
- Sediment samples based on an average 6 samples per core (average depth of 48 inches) plus duplicates (1 duplicate sample per 20 samples).
- Samples from OSD-01, OSD-02, OSD-05, OSD-06, OSD-08, and OSD-10 collected in June and July 2012 will be submitted for analysis.
- Sediment samples will be collected from probing/coring transects and location ID will be consistent with the transect ID.
- Sediment samples from additional 7 locations will not be collected for analysis during this phase of sampling. If required, those additional samples will be collected in early 2013.

NA = Not applicable

PCB = polychlorinated biphenyls

TOC = total organic carbon

USGS = United States Geological Survey

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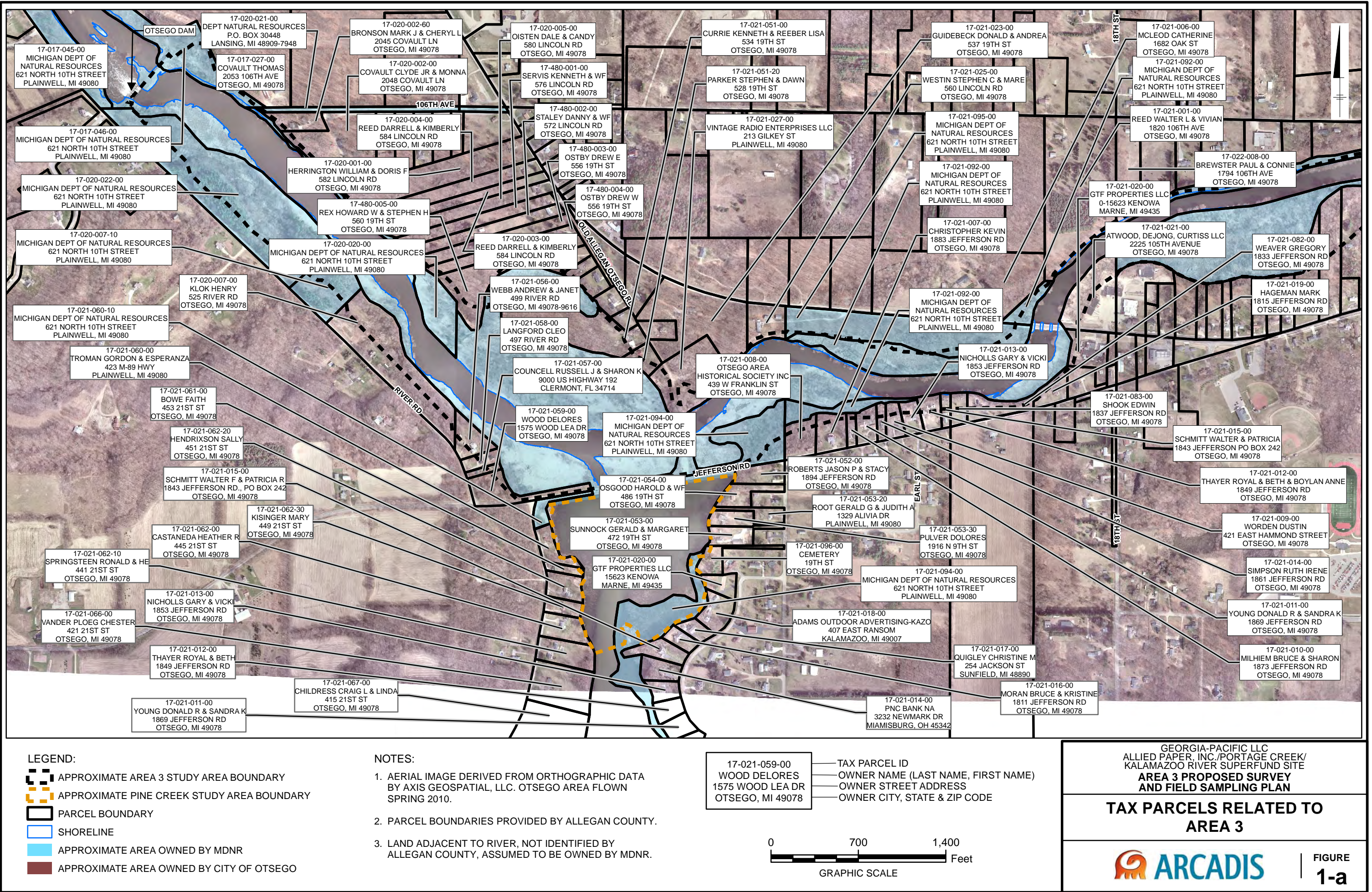
Table 2 - Summary of Existing and Proposed Sample Densities by Strata

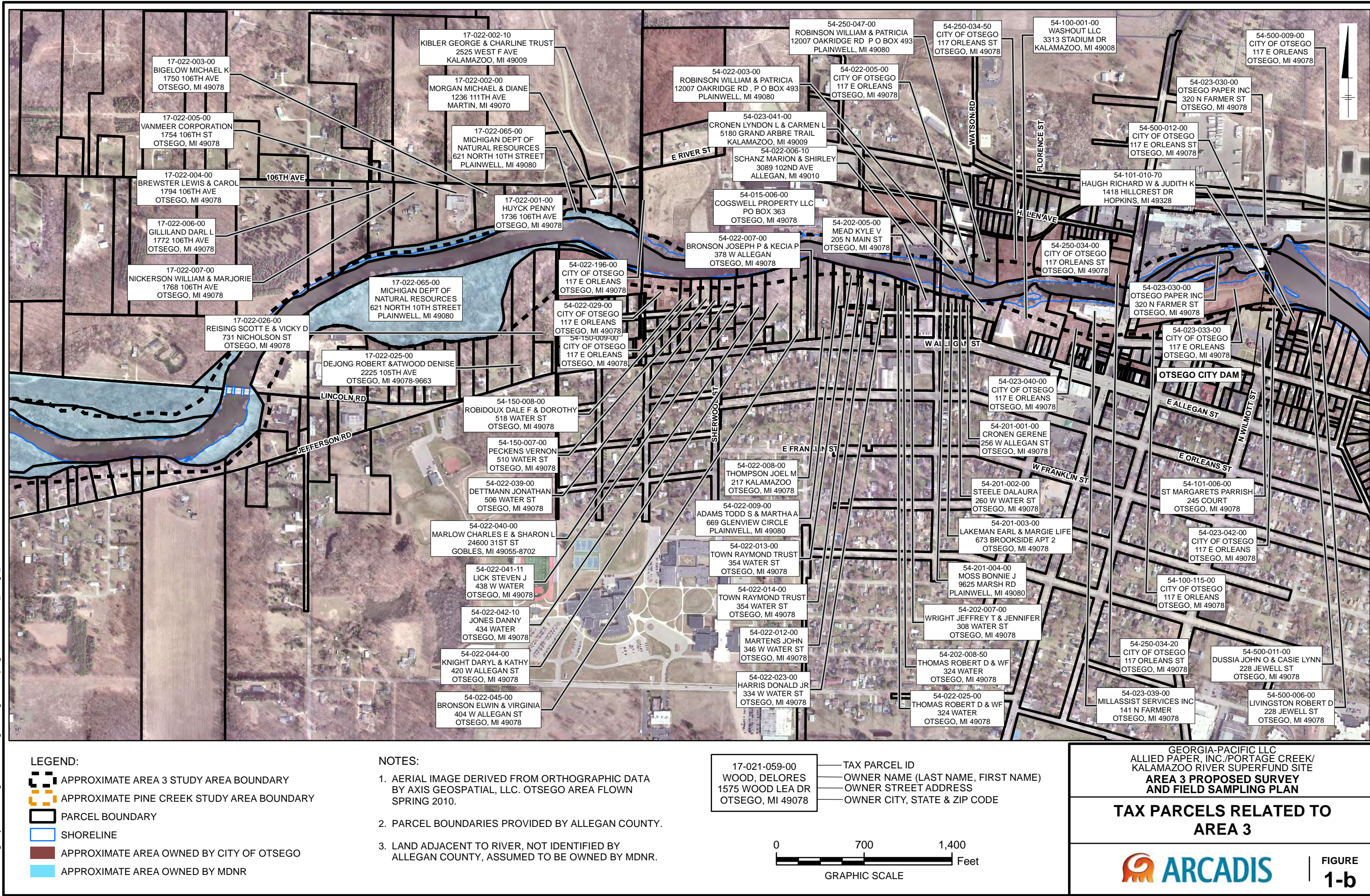
Geomorphic Unit ID	Geomorphic Unit Classification	Area (acres)	Existing Sample Locations ¹	Proposed Sample Locations	Total Sample Locations	Existing Density (core/acre)	Proposed Density (core/acre)	Total Density (core/acre)
	Outside Geomorphic Units - Islands	1.1	0	0	0	0.00	0.00	0.00
	Outside Geomorphic Units - North Bank Downstream of Lincoln Road/M-89 Bridge	8.0	3	1	4	0.38	0.13	0.50
	Outside Geomorphic Units - North Bank Upstream of Lincoln Road/M-89 Bridge	7.9	0	0	0	0.00	0.00	0.00
	Outside Geomorphic Units - Pine Creek Area	29.2	0	0	0	0.00	0.00	0.00
	Outside Geomorphic Units - South Bank Downstream of Lincoln Road/M-89 Bridge	22.7	13	0	13	0.57	0.00	0.57
	Outside Geomorphic Units - South Bank Upstream of Lincoln Road/M-89 Bridge	37.3	0	10	10	0.00	0.27	0.27
PC01	Previous Channel	1.5	1	2	3	0.67	1.33	2.00
PC02	Previous Channel	7.8	8	13	21	1.02	1.66	2.68
PC03	Previous Channel	29.9	9	24	33	0.30	0.80	1.10
PC04	Previous Channel	5.5	0	5	5	0.00	0.92	0.92
PC05	Previous Channel	7.4	1	11	12	0.13	1.48	1.62
PC06	Previous Channel	3.1	2	3	5	0.65	0.98	1.63
PC07	Previous Channel	2.2	1	6	7	0.46	2.76	3.22
PC08	Previous Channel	10.1	5	12	17	0.50	1.19	1.69
PC09	Previous Channel	2.1	0	2	2	0.00	0.94	0.94
PC10	Previous Channel	0.7	0	3	3	0.00	4.13	4.13
PC11	Previous Channel	5.6	0	2	2	0.00	0.36	0.36
T1	Terrace	1.04	1	1	2	0.96	0.96	1.92
T2	Terrace	0.31	0	1	1	0.00	3.23	3.23
T3	Terrace	2.32	3	1	4	1.29	0.43	1.72
T4	Terrace	0.97	1	2	3	1.03	2.06	3.10
T5	Terrace	3.92	0	5	5	0.00	1.28	1.28
T6	Terrace	5.54	1	9	10	0.18	1.62	1.81
T7	Terrace	3.12	1	5	6	0.32	1.60	1.93
Total Area 3		199.2	50	118	168	0.25	0.59	0.84
Area 3 - Downstream of Lincoln Road/M-89 Bridge		115.3	50	101	151	0.43	0.88	1.31
Previous Channel		75.9	27	83	110	0.36	1.09	1.45
Terrace		17.2	7	24	31	0.41	1.39	1.80

Notes:

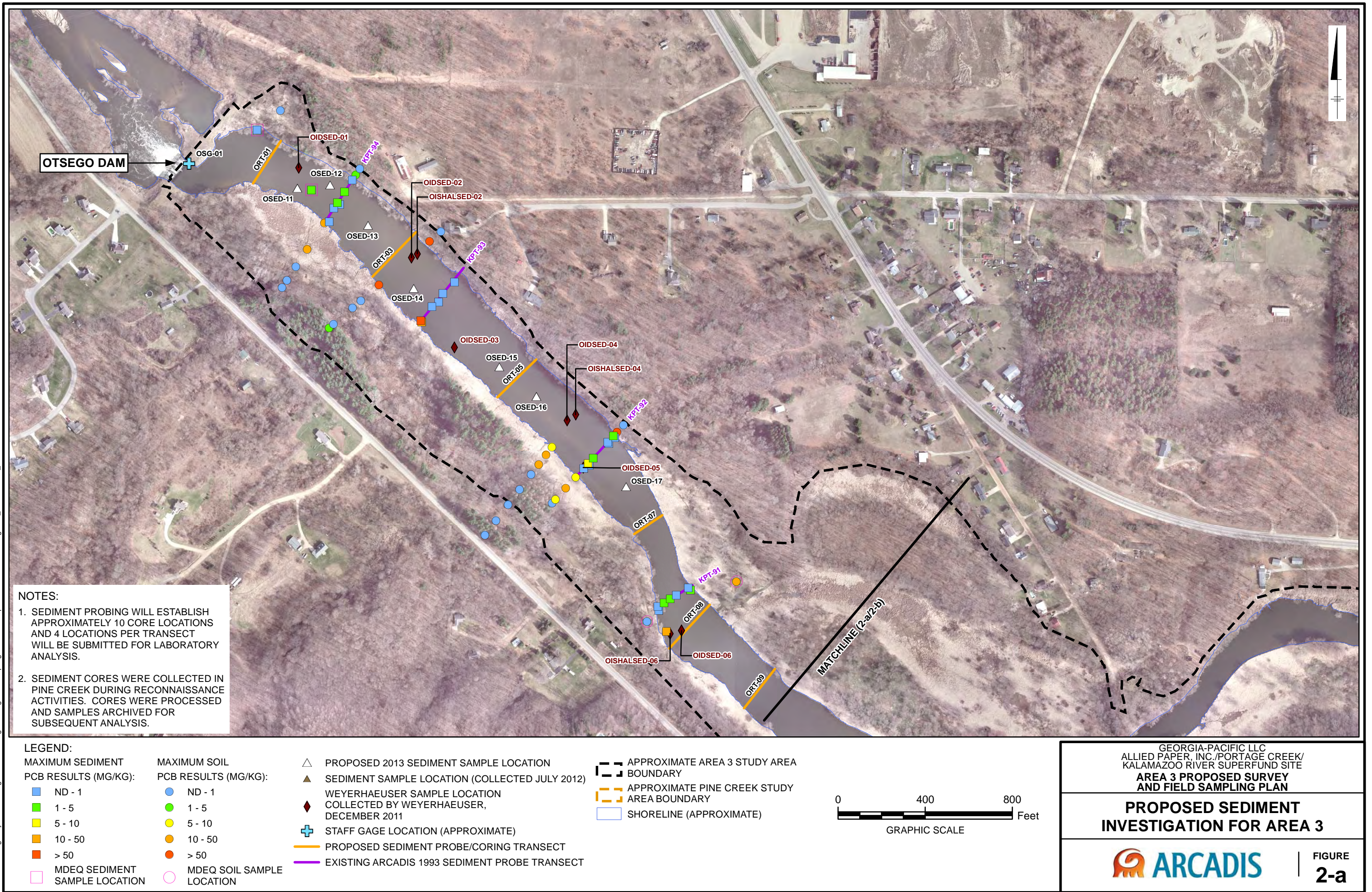
1. Sample count includes soil samples collected during 1993 Floodplain Investigation, 1993/1994 Former Impoundment Sediment Investigation, and 2000 Focused Sediment Sampling.

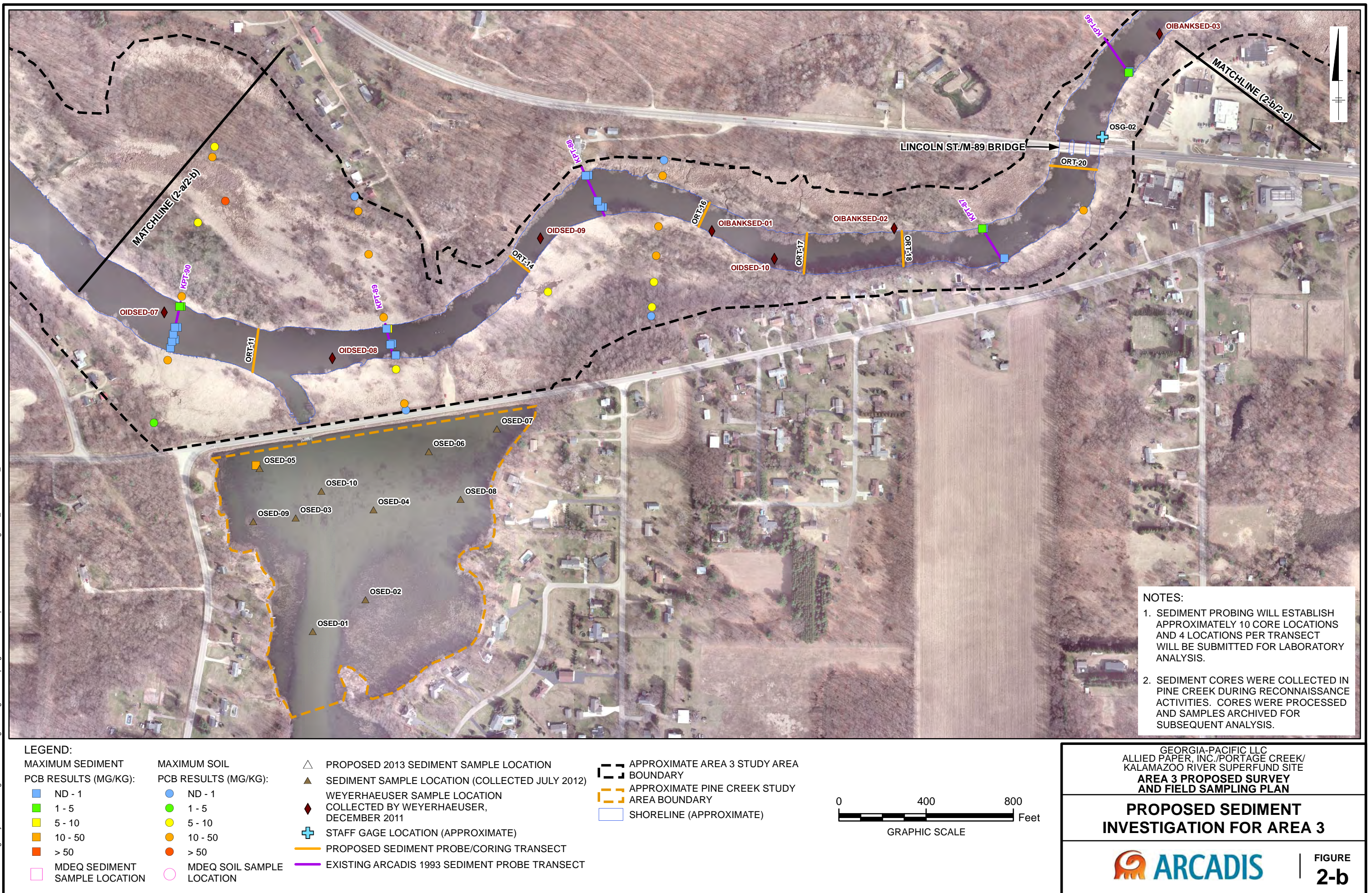
Figures



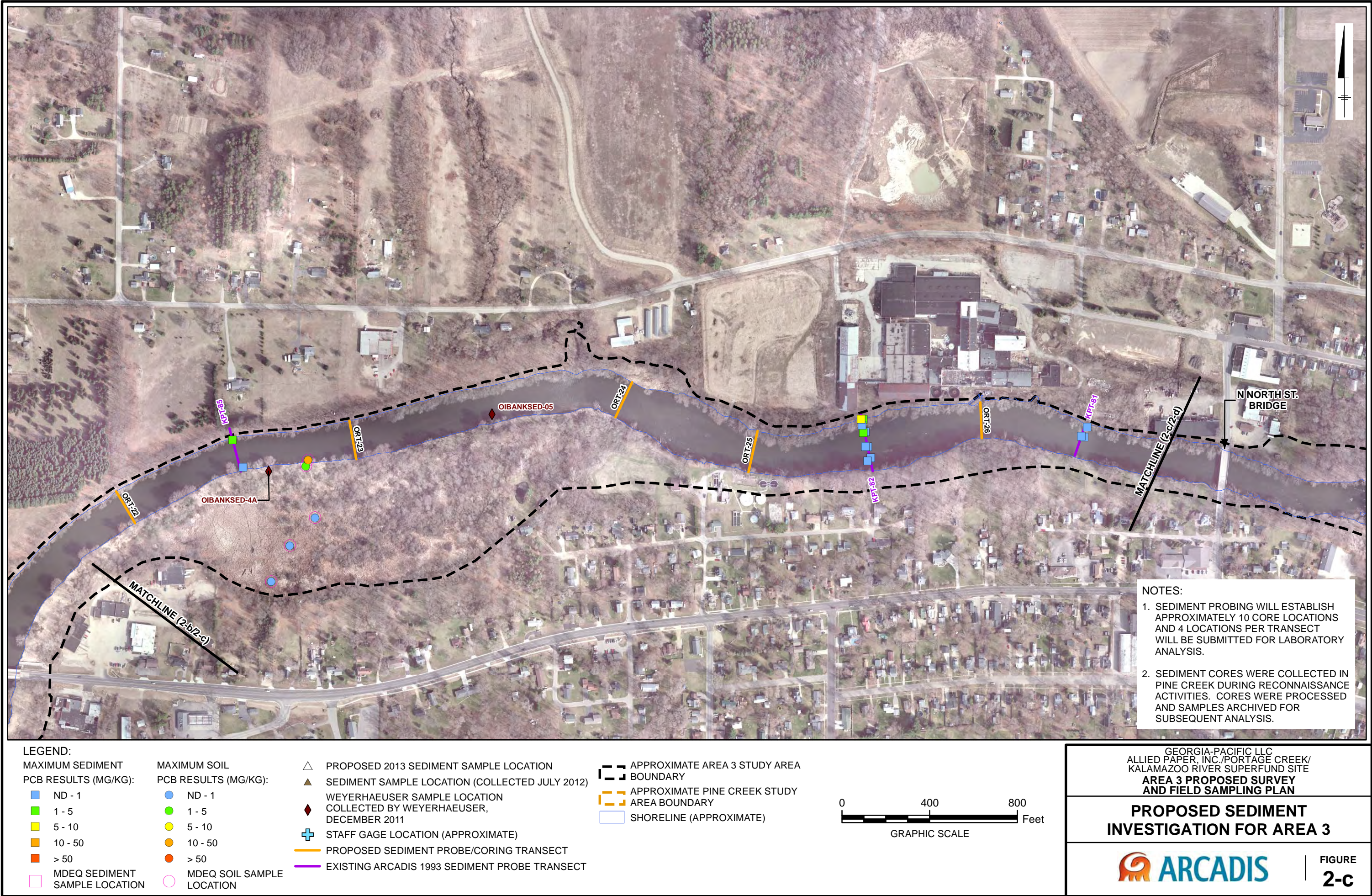


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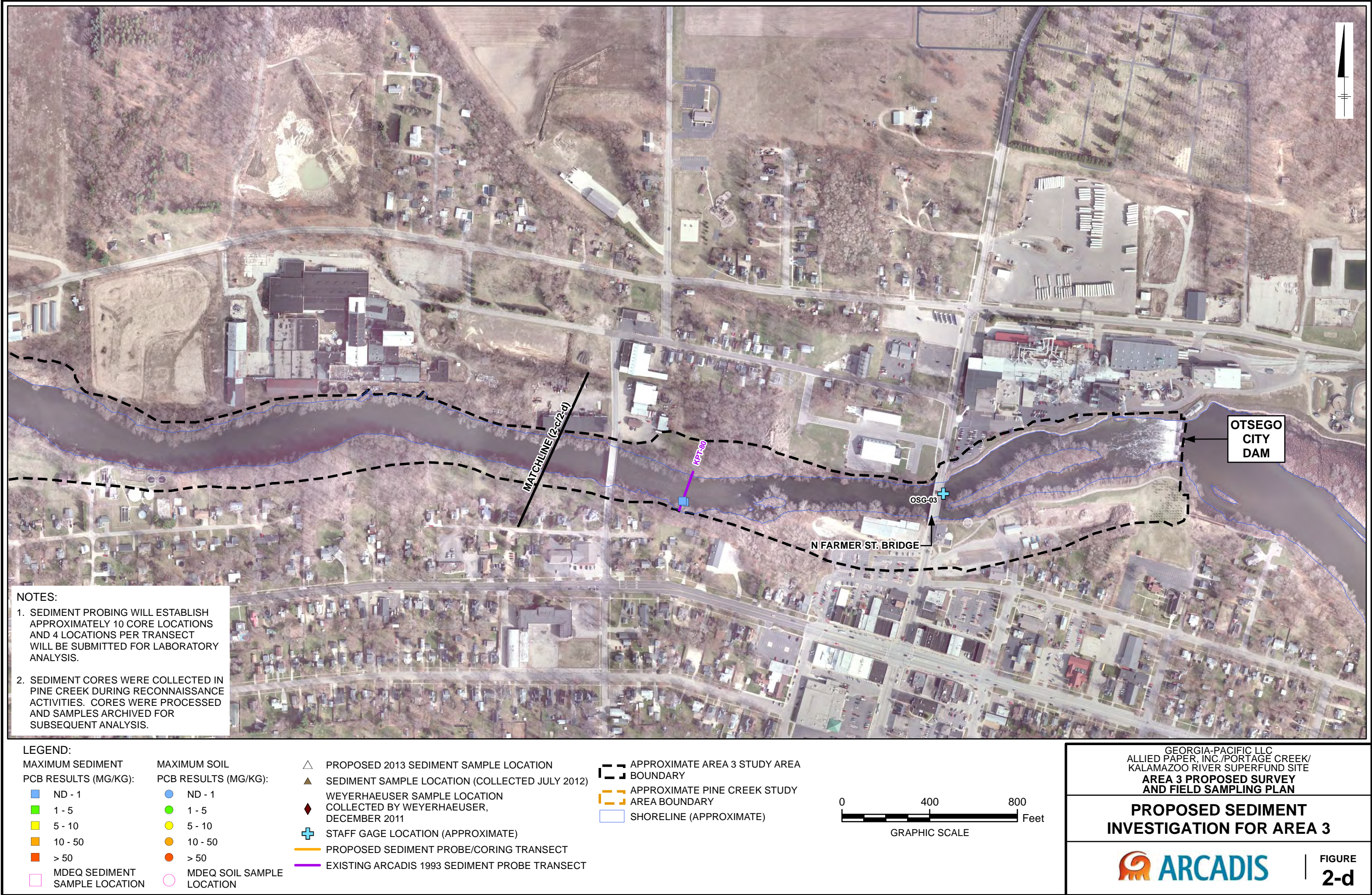




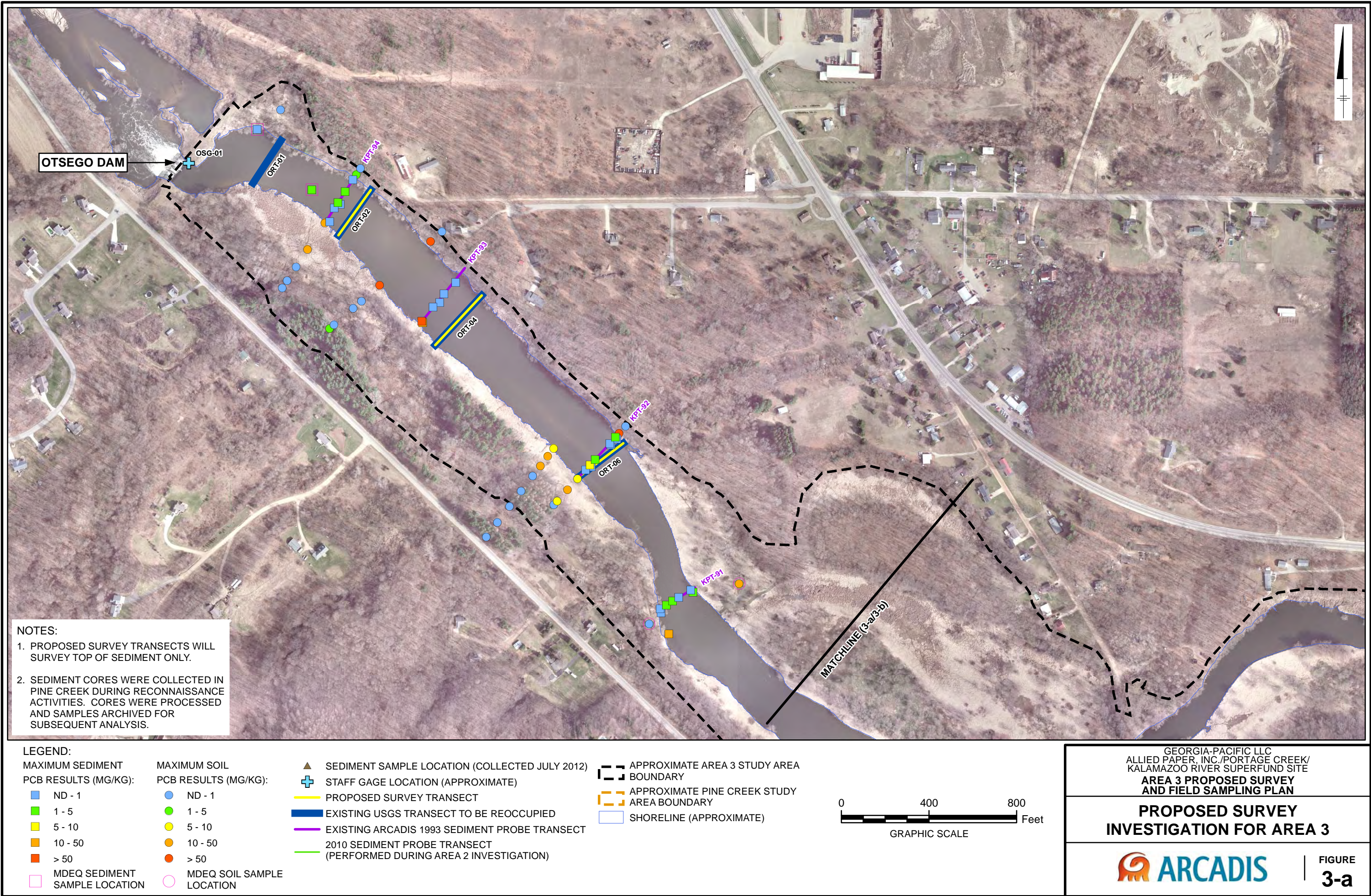
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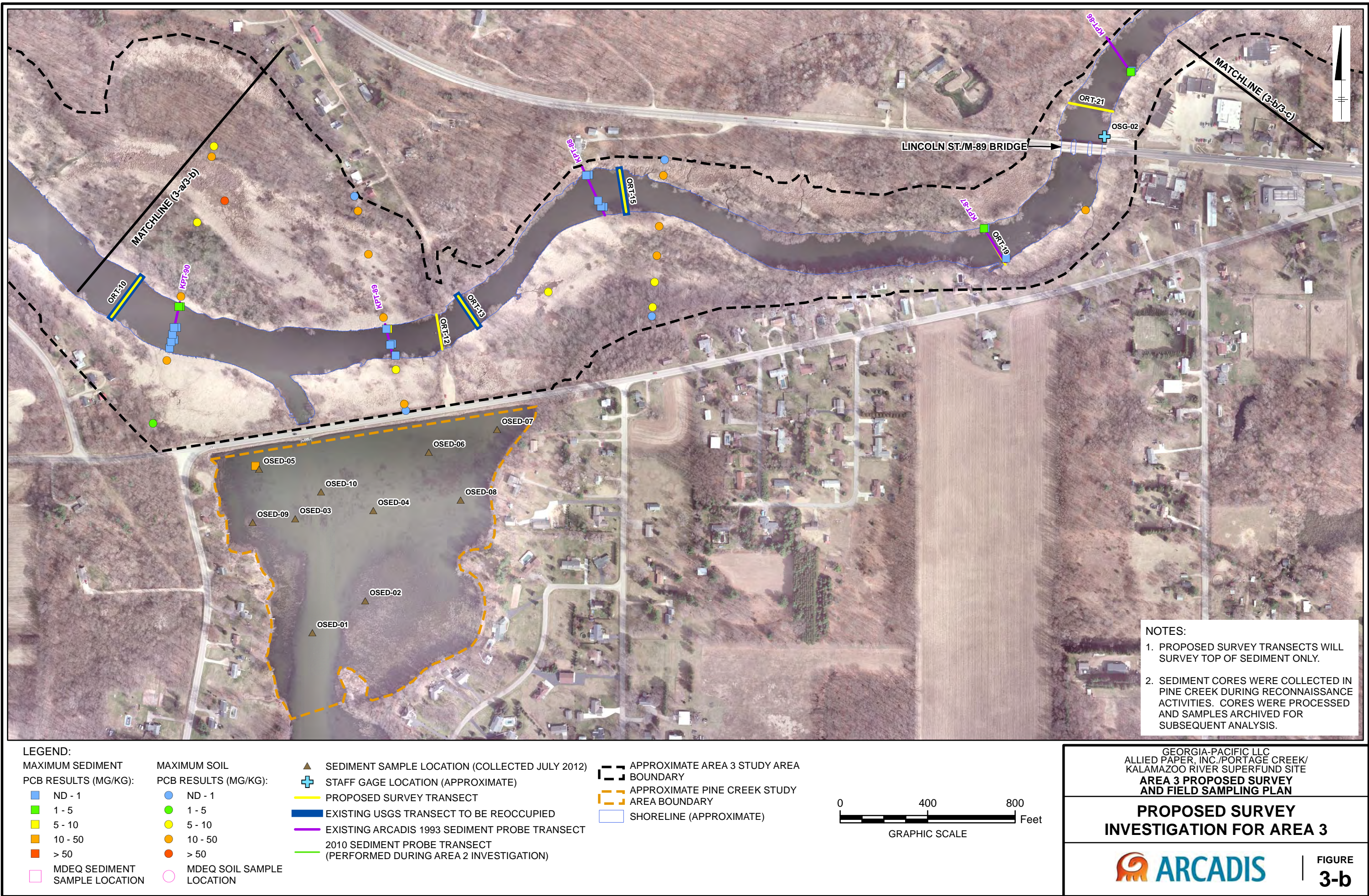
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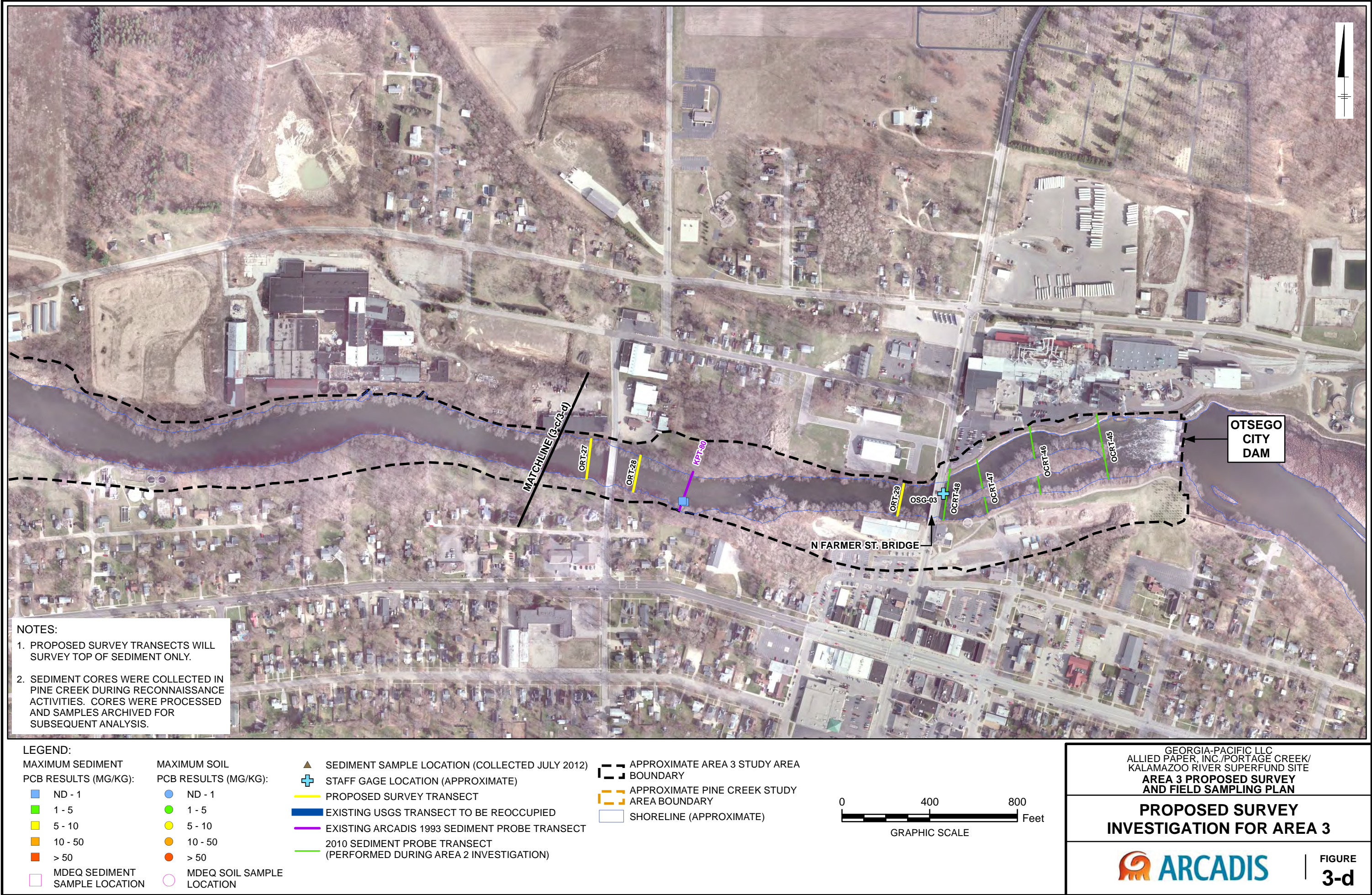
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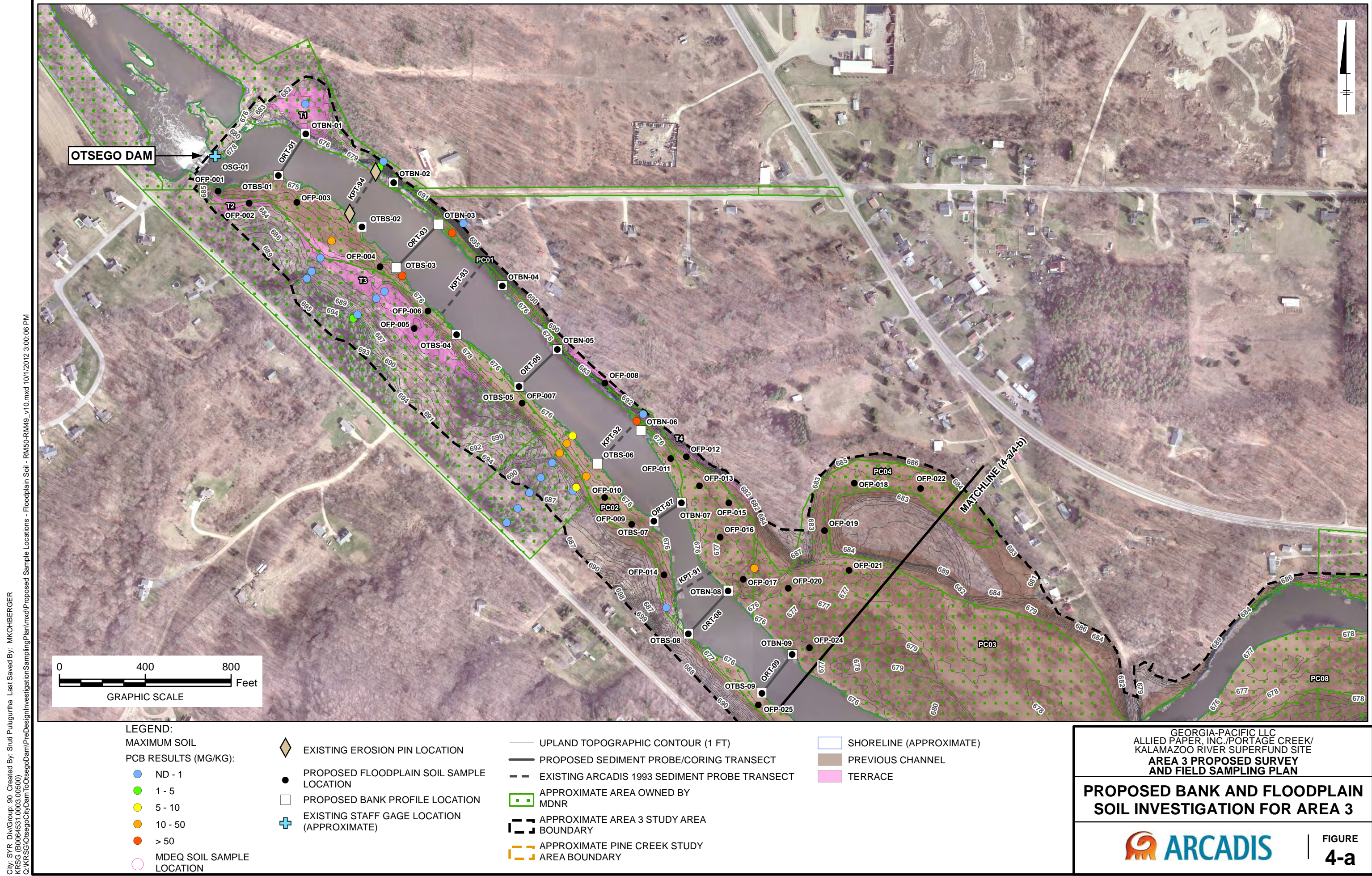


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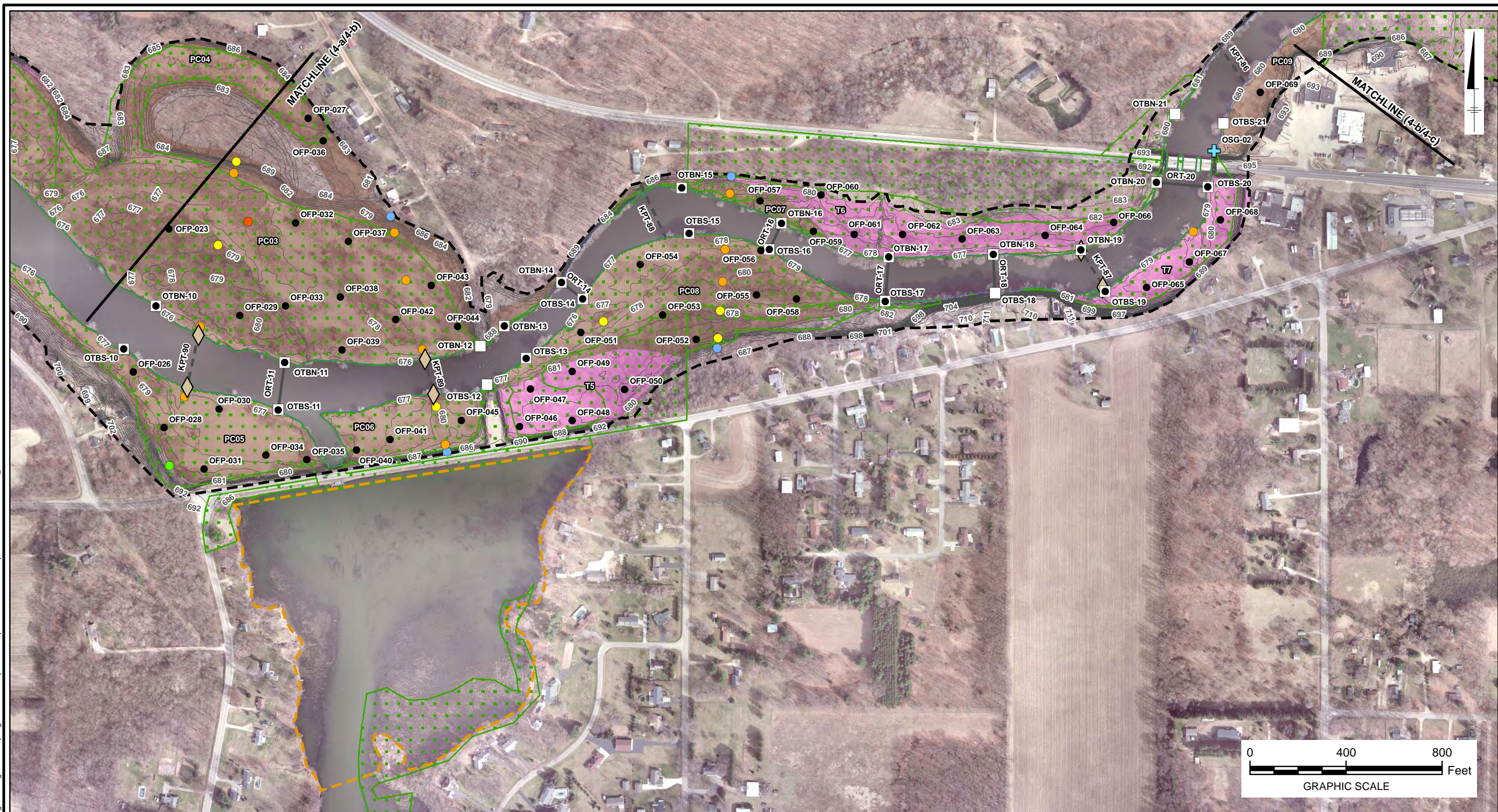


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LEGEND:

MAXIMUM SOIL
PCB RESULTS (MG/KG):

- ND - 1
- 1 - 5
- 5 - 10
- 10 - 50
- > 50
- MDEQ SOIL SAMPLE LOCATION

- ◆ EXISTING EROSION PIN LOCATION
- PROPOSED FLOODPLAIN SOIL SAMPLE LOCATION
- PROPOSED BANK PROFILE LOCATION
- ⊕ EXISTING STAFF GAGE LOCATION (APPROXIMATE)

- UPLAND TOPOGRAPHIC CONTOUR (1 FT)
- PROPOSED SEDIMENT PROBE/CORING TRANSECT
- - - EXISTING ARCADIS 1993 SEDIMENT PROBE TRANSECT
- APPROXIMATE AREA OWNED BY MDNR
- APPROXIMATE AREA 3 STUDY AREA BOUNDARY
- APPROXIMATE PINE CREEK STUDY AREA BOUNDARY

- SHORELINE (APPROXIMATE)
- PREVIOUS CHANNEL
- TERRACE



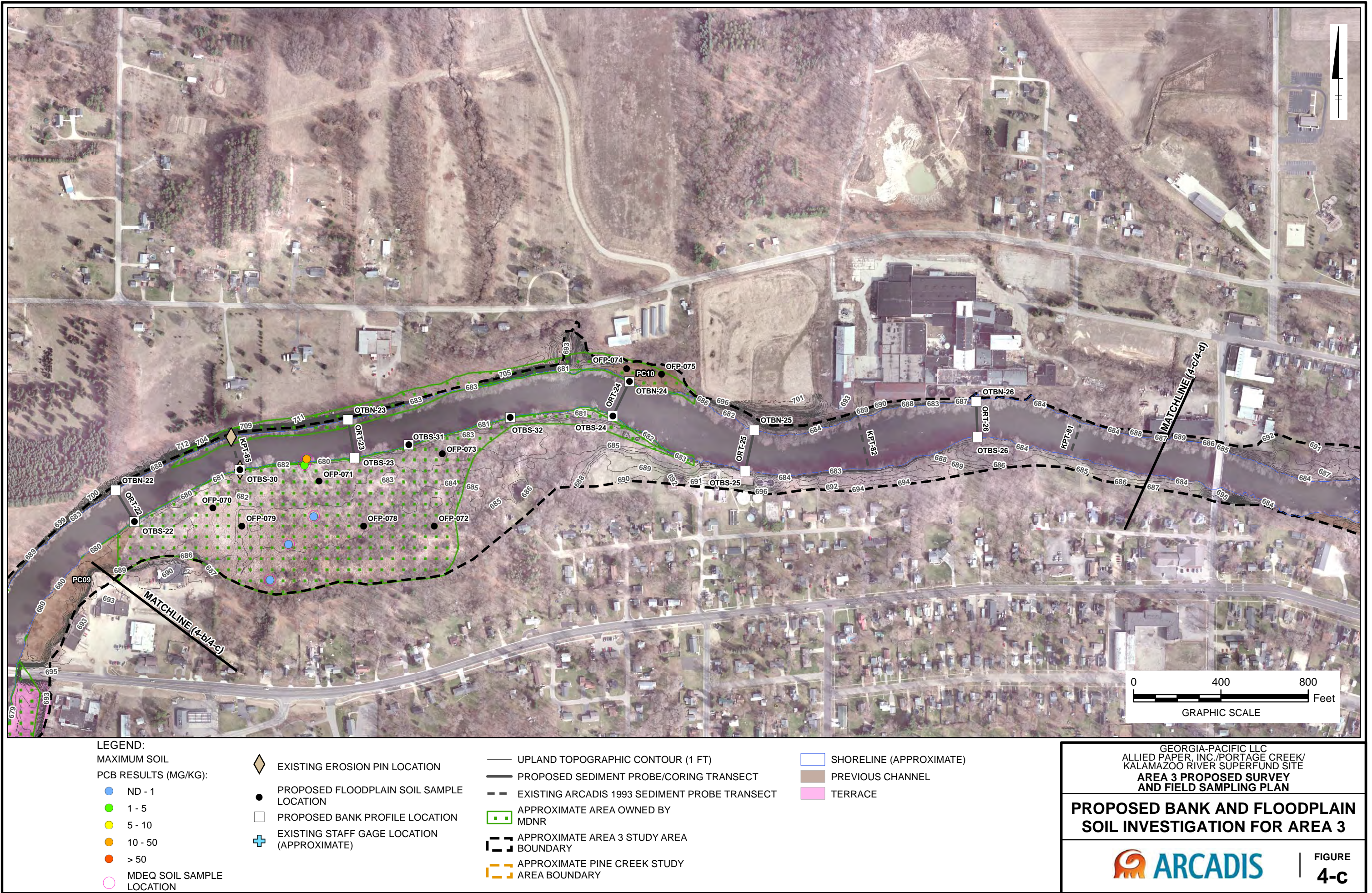
GEORGIA-PACIFIC LLC
ALLIED PAPER, INC./PORTAGE CREEK/
KALAMAZOO RIVER SUPERFUND SITE
**AREA 3 PROPOSED SURVEY
AND FIELD SAMPLING PLAN**

**PROPOSED BANK AND FLOODPLAIN
SOIL INVESTIGATION FOR AREA 3**

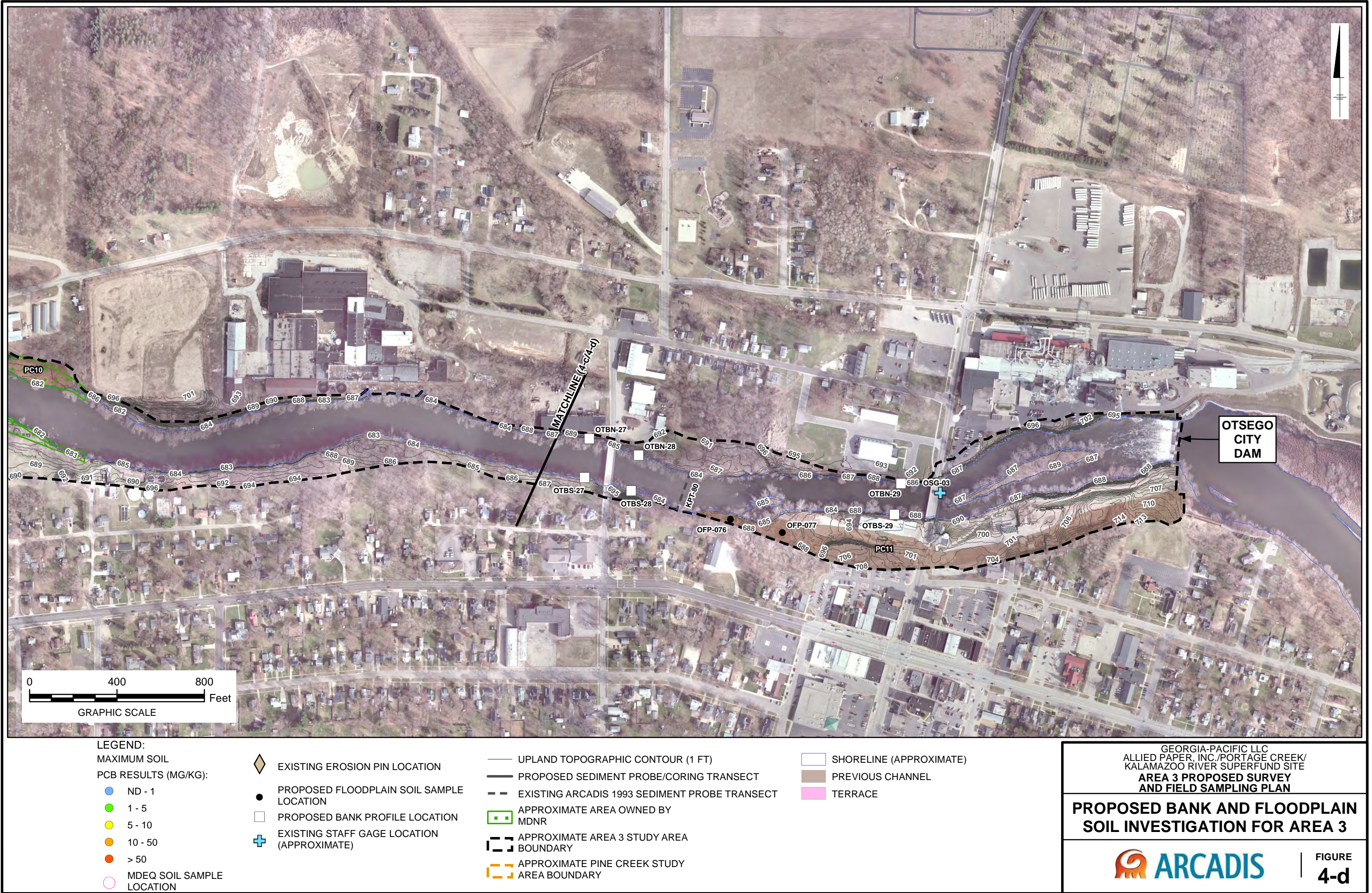


FIGURE
4-b

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**AREA 3 PROPOSED SURVEY
AND FIELD SAMPLING PLAN**

**PROPOSED BANK AND FLOODPLAIN
SOIL INVESTIGATION FOR AREA 3**

 **ARCADIS**

**FIGURE
4-d**

Attachment A

Data From Field Reconnaissance

Tables

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Supplemental Remedial Investigations/Feasibility Studies
Area 3/Former Otsego Impoundment Proposed Survey and Field Sampling Plan
Attachment A - Data From Field Reconnaissance

Table A-1 - Types of Banks Identified During Field Reconnaissance

Bank Type	Description
A	Shallow-sloped shelf to bankfull elevation, with vertical bank above
B	Sloping to bankfull elevation with woody surface protection. Vertical bank above
C	Bankfull bench (Sloping to bankfull elevation. Level shelf at bankfull elevation. Terraces above)
D	45° bank slope protected with cobbles/boulders
F	Low vertical bank at residential property with lawn extending to the river
G	Low vertical rock-lined bank at residential property with lawn extending to the river
H	Top of bank at bankfull elevation. Shelf supporting wetlands beyond
I	Low (2-3 feet) vertical erosive bank (fine materials)
J	High bank (> 10 feet in height) densely vegetated
K	Low (2-3 feet) bank with wetland of reed canary grass and cattail beyond
L	Low bank (3 feet) where bankfull is at top-of-bank with reed canary grass vegetation
M	Low bank (2.5 feet) where bankfull is at top-of-bank with emergent wetland vegetation
N	Shallow sloped bank to upland forest area

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Attachment A - Data From Field Reconnaissance

Table A-2 - Reconnaissance Field Notes - Sample Coordinates

Location ID	Date	Easting	Northing	Coordinate source	Probe Description
ORBN-01	6/25/2012	12757440.39	352883.37	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBN-02	6/25/2012	12757686.94	353275.18	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBN-03	6/25/2012	12760188.08	354159.42	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBN-04	6/25/2012	12760379.21	354124.56	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBN-05	6/25/2012	12760631.77	354021.17	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBN-06	6/25/2012	12760928.58	353874.69	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBN-07	6/25/2012	12761295.19	353860.74	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBN-08	6/25/2012	12761380.58	353888.08	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBN-09	6/25/2012	12761510.27	353890.09	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBN-10	6/25/2012	12762020.81	353997.66	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBN-11	6/25/2012	12762252.78	354001.97	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBN-12	6/25/2012	12762749.51	353858.71	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBN-13	6/25/2012	12762917.38	353830.90	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBN-14	6/25/2012	12762995.07	353816.37	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBN-15	6/25/2012	12763203.75	353772.17	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBN-16	6/25/2012	12763352.26	353702.65	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBN-17	6/25/2012	12763570.13	353667.43	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBN-18	6/26/2012	12750946.51	354670.64	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBN-19	6/26/2012	12751302.79	354407.47	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBN-20	6/26/2012	12751532.03	354172.12	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBN-21	6/26/2012	12751868.67	353777.03	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBN-22	6/26/2012	12752204.20	353468.55	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBN-23	6/26/2012	12754519.86	351992.56	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBN-24	6/26/2012	12754870.82	352217.63	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBN-25	6/26/2012	12754965.99	352335.62	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBN-26	6/26/2012	12755285.63	352643.04	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBN-27	6/26/2012	12755769.77	352541.58	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBN-28	6/27/2012	12763602.97	353653.38	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBN-29	6/27/2012	12763646.15	353682.69	ARCADIS GPS Units	2012 Area 3 Reconnaissance
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ORBS-02	6/25/2012	12764261.72	353540.12	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBS-03	6/25/2012	12764230.91	353540.29	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBS-04	6/25/2012	12764131.65	353528.20	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBS-05	6/25/2012	12764108.25	353541.32	ARCADIS GPS Units	2012 Area 3 Reconnaissance

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Attachment A - Data From Field Reconnaissance

Table A-2 - Reconnaissance Field Notes - Sample Coordinates

Location ID	Date	Easting	Northing	Coordinate source	Probe Description
ORBS-06	6/25/2012	12764039.27	353540.63	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBS-07	6/25/2012	12763991.58	353538.71	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBS-08	6/25/2012	12763938.99	353548.78	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBS-09	6/25/2012	12763882.29	353595.06	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBS-10	6/25/2012	12763780.02	353556.85	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBS-11	6/25/2012	12763772.72	353521.40	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBS-12	6/25/2012	12763663.46	353525.96	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBS-13	6/25/2012	12763526.79	353524.17	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBS-14	6/25/2012	12763406.15	353600.70	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBS-15	6/25/2012	12763343.20	353621.74	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBS-16	6/25/2012	12762940.53	353699.67	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBS-17	6/25/2012	12762667.72	353805.68	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBS-18	6/25/2012	12762436.20	353801.50	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBS-19	6/25/2012	12762332.11	353852.42	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBS-20	6/25/2012	12762042.65	353878.59	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBS-21	6/25/2012	12761901.64	353863.68	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBS-22	6/25/2012	12760433.56	353969.32	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBS-23	6/25/2012	12759750.73	353975.07	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBS-24	6/25/2012	12759330.36	353814.40	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBS-25	6/25/2012	12759238.15	353801.38	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBS-26	6/25/2012	12758423.13	353653.00	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBS-27	6/25/2012	12758218.25	353543.23	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBS-28	6/25/2012	12757975.25	353411.71	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBS-29	6/25/2012	12757771.62	353201.73	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBS-30	6/25/2012	12757644.74	352917.51	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBS-31	6/25/2012	12757629.19	352870.87	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBS-32	6/26/2012	12757597.26	352760.76	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBS-33	6/26/2012	12757054.99	352314.71	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBS-34	6/26/2012	12756380.46	352282.61	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBS-35	6/26/2012	12755580.61	352550.37	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBS-36	6/26/2012	12755392.94	352542.69	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBS-37	6/26/2012	12752631.87	352528.20	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBS-38	6/26/2012	12752468.48	352685.18	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBS-39	6/26/2012	12752480.55	352642.89	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBS-40	6/26/2012	12752441.15	352843.38	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORBS-41	6/26/2012	12751468.64	353854.99	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORFP-01	6/26/2012	12750874.25	354833.65	ARCADIS GPS Units	2012 Area 3 Reconnaissance

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Table A-2 - Reconnaissance Field Notes - Sample Coordinates

Location ID	Date	Easting	Northing	Coordinate source	Probe Description
ORFP-02	6/26/2012	12750764.29	354867.72	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORFP-03	6/26/2012	12750716.61	354934.13	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORFP-04	6/26/2012	12751294.77	353997.51	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORFP-05	6/26/2012	12751201.70	353970.64	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORFP-06	6/26/2012	12751288.50	353766.75	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORFP-07	6/26/2012	12751280.78	353758.59	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORFP-08	6/26/2012	12752791.57	352697.31	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORFP-09	6/26/2012	12753062.23	352581.94	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORFP-10	6/26/2012	12753234.88	352414.62	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORFP-11	6/26/2012	12753561.97	352564.43	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORFP-12	6/26/2012	12753135.21	352950.20	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORFP-13	6/27/2012	12754426.96	352234.47	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORFP-14	6/27/2012	12754248.72	352406.85	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORFP-15	6/27/2012	12754202.66	352555.12	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORFP-16	6/27/2012	12754627.30	352110.99	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORFP-17	6/27/2012	12754678.33	352239.31	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORFP-18	6/27/2012	12755396.64	352293.50	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORFP-19	6/27/2012	12755054.45	351943.11	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORFP-20	6/27/2012	12755420.97	352022.94	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORFP-21	6/27/2012	12755799.36	352130.29	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORFP-22	6/27/2012	12755775.62	352713.24	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORFP-23	6/27/2012	12756212.51	352681.85	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORFP-24	6/28/2012	12757391.86	352959.31	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORFP-25	6/28/2012	12757476.44	353076.81	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORFP-26	6/28/2012	12757249.38	352699.39	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORFP-27	6/28/2012	12757202.01	352540.86	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORFP-28	6/28/2012	12757177.02	352590.43	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORFP-29	6/28/2012	12757965.84	353316.98	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORFP-30	6/28/2012	12758073.99	353268.84	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORFP-31	6/28/2012	12758328.97	353407.10	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORFP-32	6/28/2012	12758401.00	353339.72	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORFP-33	6/28/2012	12758701.36	353135.47	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORFP-34	6/28/2012	12759612.18	353800.22	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORFP-35	6/28/2012	12759264.65	353671.68	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORFP-36	6/28/2012	12760450.20	354144.63	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORFP-37	6/28/2012	12760489.43	354163.05	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORFP-38	6/28/2012	12760206.47	354176.37	ARCADIS GPS Units	2012 Area 3 Reconnaissance

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Table A-2 - Reconnaissance Field Notes - Sample Coordinates

Location ID	Date	Easting	Northing	Coordinate source	Probe Description
ORSED-01	6/25/2012	12763669.20	353491.45	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORSED-02	6/26/2012	12752561.93	352505.28	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORSED-03	6/26/2012	12752596.88	352513.28	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORSED-04	6/26/2012	12752579.83	352536.98	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORSED-05	6/26/2012	12751466.28	353856.90	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORSED-06	6/26/2012	12751472.52	353885.46	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORSED-07	6/28/2012	12756219.28	352269.05	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORSED-08	6/28/2012	12755716.24	352618.77	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORSED-09	6/28/2012	12755456.61	352694.81	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORSED-10	6/28/2012	12755272.27	352515.97	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORSED-11	6/28/2012	12755273.81	352506.49	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORSED-12	6/28/2012	12754676.39	352106.55	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORSED-13	6/28/2012	12754682.38	352101.17	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORSED-14	6/28/2012	12753939.83	351982.10	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORSED-15	6/29/2012	12760950.63	353894.33	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORSED-16	6/29/2012	12761151.30	353852.91	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORSED-17	6/29/2012	12763506.58	353526.03	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORSED-18	6/29/2012	12763589.35	353516.12	ARCADIS GPS Units	2012 Area 3 Reconnaissance
ORSED-19	6/29/2012	12763547.07	353490.55	ARCADIS GPS Units	2012 Area 3 Reconnaissance
OSD-01	7/11/2012	12754008.66	350599.75	ARCADIS GPS Units	2012 Area 3 Reconnaissance
OSD-02	7/11/2012	12754249.90	350746.60	ARCADIS GPS Units	2012 Area 3 Reconnaissance
OSD-03	7/11/2012	12753929.84	351119.72	ARCADIS GPS Units	2012 Area 3 Reconnaissance
OSD-04	7/11/2012	12754287.30	351158.29	ARCADIS GPS Units	2012 Area 3 Reconnaissance
OSD-05	6/29/2012	12753764.45	351347.50	ARCADIS GPS Units	2012 Area 3 Reconnaissance
OSD-06	6/29/2012	12754541.32	351425.35	ARCADIS GPS Units	2012 Area 3 Reconnaissance
OSD-07	6/29/2012	12754853.93	351528.16	ARCADIS GPS Units	2012 Area 3 Reconnaissance
OSD-08	6/29/2012	12754687.44	351206.22	ARCADIS GPS Units	2012 Area 3 Reconnaissance
OSD-09	6/29/2012	12753735.59	351104.51	ARCADIS GPS Units	2012 Area 3 Reconnaissance
OSD-10	6/29/2012	12754048.19	351243.83	ARCADIS GPS Units	2012 Area 3 Reconnaissance

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Table A-3 - Reconnaissance Field Notes - Sediment Probing Data

Location ID	Date	Water Depth (feet)	Probe Depth (feet)	Penetration (feet)	Recovery (feet)	Method	Probe Description / Notes
ORSED-01	6/25/2012			4.7	1.0	3" Lexan	silt over gravel, hard bottom
ORSED-02	6/26/2012			7.0	2.4	3" Lexan	top foot-clayey silt with trace organics, no hard bottom
ORSED-03	6/26/2012			-	-	3" Lexan	CDM core (Pickerel Weed Wetland area)
ORSED-04	6/26/2012			4.0	3.1	3" Lexan	-
ORSED-05	6/26/2012			2.0	1.3	3" Lexan	-
ORSED-06	6/26/2012			5.0	3.0	3" Lexan	-
ORSED-07	6/28/2012			-	-	3" Lexan	dark grey color, sandy silt, no recovery - 3 attempts
ORSED-08	6/28/2012			2.2	1.4	3" Lexan	deposit at mouth of small inflow channel - sandy elsewhere
ORSED-09	6/28/2012			3.3	0.8	3" Lexan	area extends 15 - 20 feet from bank - potential bank collapse rather than sediment deposit
ORSED-10	6/28/2012			2.4	1.8	3" Lexan	-
ORSED-11	6/28/2012			3.3	1.8	3" Lexan	area extends approximately 20 feet from bank and approximately 50 feet downstream from downed tree
ORSED-12	6/28/2012			-	2.3	3" Lexan	CDM core
ORSED-13	6/28/2012			5.0	3.3	3" Lexan	located approximately 8 feet from ORSED-12
ORSED-14	6/28/2012			3.8	1.5	3" Lexan	located across the channel from the Pine Creek outflow
ORSED-15	6/29/2012				7.0	3" Lexan	-
ORSED-16	6/29/2012			3.0	2.0	3" Lexan	-
ORSED-17	6/29/2012			2.0	1.7	3" Lexan	-
ORSED-18	6/29/2012			-	-	3" Lexan	CDM core, gray materials (clay) identified at 2 to 2.5 feet below ground surface
ORSED-19	6/29/2012			2.0	1.5	3" Lexan	sediment area around ORSED-18 and ORSED-19 is backwater area extending upstream from the river on the south side and has berms on either side
OSED-05	6/29/2012	7.0	4.6	4.1	3.0	3" Lexan	-
OSED-06	6/29/2012	7.8	2.2	3.2	2.7	3" Lexan	-
OSED-07	6/29/2012	7.9		2.2	2.0	3" Lexan	Pine Creek Cores
OSED-08	6/29/2012	8.2		5.0	4.0	3" Lexan	
OSED-09	6/29/2012	3.6	2.4	2.9	2.9	3" Lexan	
OSED-10	6/29/2012	9.7		3.8	2.9	3" Lexan	
OSED-01	7/11/2012	6	5.2	5.5	3.5	3" Lexan	
OSED-02	7/11/2012	4	2.9	3.8	3.5	3" Lexan	
OSED-04	7/11/2012	9.1	3	4.5	4.0	3" Lexan	
OSED-03	7/11/2012	9.1	3.79	4.4	3.5	3" Lexan	

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Table A-4 - Reconnaissance Field Notes - Floodplain Vegetation Assessment

Location ID	Date	Water Depth BGS (inches)	Penetration (inches)	Recovery (inches)	Method	Floodplain Type	Vegetation Description
ORFP-01	6/26/2012	-	32	32	Hand Auger	Forest Upland	confirmed outer boundary of floodplain area 1
ORFP-02	6/26/2012	29	30	30	Hand Auger	Upland Field	pokeweed, box elder, stinging nettle, reed canary grass
ORFP-03	6/26/2012	24	36	36	Hand Auger	Wet Meadow Wetland	narrow leaf cattail, jewel weed, joe pye weed
ORFP-04	6/26/2012	24	72	37	Hand Auger and 3" Lexan	Emergent Wetland	reed canary grass
ORFP-05	6/26/2012	25	30	30	Hand Auger	Terrace	joe pye weed, stinging nettles, ash, box elder, emergent marsh/wet meadow (on terrace, likely groundwater)
ORFP-06	6/26/2012	-	32	32	Hand Auger	Terrace	
ORFP-07	6/26/2012	30	36	36	Hand Auger	Perched Wetland	scrub shrub, arrow arum, joe pye weed, jewel reed, dogwood, cattail
ORFP-08	6/26/2012	39	42	42	Hand Auger	Open Field	vegetation ground ivy (mowed), some trees
ORFP-09	6/26/2012	57	78	78	Hand Auger and 3" Lexan	Young Forest	mulberry, reed canary grass, dogwood, ragweed, stinging nettle, smart week, silver maple
ORFP-10	6/26/2012	48	78	56	Hand Auger and 3" Lexan	Field/Young Forest	green ash, great ragweed, yellow avens, jewel weed, stinging nettle, garlic mustard
ORFP-11	6/26/2012	-	78	59	Hand Auger and 3" Lexan	Wet Meadow	rice cut grass, cattails on fringe around northern part of previous channel area
ORFP-12	6/26/2012	36	66	60	Hand Auger and 3" Lexan	-	
ORFP-13	6/27/2012	-	66	61	Hand Auger and 3" Lexan	Young Forest	shrub, dogwood, black walnut, reed canary grass, box elder
ORFP-14	6/27/2012	29	78	56	Hand Auger and 3" Lexan	Wet Meadow	reed canary grass, cattails (micro-habitat)
ORFP-15	6/27/2012	36	78	66	Hand Auger and 3" Lexan	Forest Upland	close to wet forest, box elder, hackberry, locust, green ash
ORFP-16	6/27/2012	42	63	65	Hand Auger and 3" Lexan	Young Forest	box elder, stinging nettle, reed canary grass, green ash
ORFP-17	6/27/2012	52	55	52	Hand Auger and 3" Lexan	Mixed Field/Forest	mesic forest (almost wet), locust, box elder, elm, green ash, jewel weed, ragweed, stinging nettle
ORFP-18	6/27/2012	41	56	56	Hand Auger and 3" Lexan	Upland Field	reed canary grass, thistle, goldenrod
ORFP-19	6/27/2012	43	45	45	Hand Auger and 3" Lexan	Mesic Forest	black walnut, box elder, burdock, jewel weed, poke weed, catnip
ORFP-20	6/27/2012	43	50	50	Hand Auger and 3" Lexan	In Channel	strawberry, garlic mustard, jewel weed, green ash seedlings, violet, blackberry
ORFP-21	6/27/2012	48	52	52	Hand Auger and 3" Lexan	In Channel	green ash seedlings, jewel weed, cone flower
ORFP-22	6/27/2012	6	66	39	Hand Auger and 3" Lexan	Emergent Wetland	narrow leaf cattail, jewel weed, willows, joe pye weed
ORFP-23	6/27/2012	12	44	65	Hand Auger and 3" Lexan	Emergent Wetland	bur-reed, narrow leaf cattail, multi-flora rose
ORFP-24	6/28/2012	-	40	40	Hand Auger	Floodplain Forest	green ash, silver maple, red bud, reed canary grass, goldenrod, white avens
ORFP-25	6/28/2012	-	30	30	Hand Auger	Floodplain Forest	grey birch, ironwood, green ash, wood nettle, white avens
ORFP-26	6/28/2012	32	46	48	Hand Auger and 3" Lexan	Emergent Wetland	narrow leaf and broad leaf cattail, stinging nettle, sensitive fern
ORFP-27	6/28/2012	30	47	51	Hand Auger and 3" Lexan	Transitional Floodplain	goldenrod, aster, willow, sycamore, silver maple
ORFP-28	6/28/2012	31	43	43	Hand Auger	Emergent Wetland	narrow leaf cattail, willow, arrow arum, sensitive fern
ORFP-29	6/28/2012	-	49	52	Hand Auger and 3" Lexan	Floodplain Forest	box elder, silver maple, green ash, reed canary grass
ORFP-30	6/28/2012	-	-	-	-	-	top of berm defining study area boundary
ORFP-31	6/28/2012	32	43	43	Hand Auger	Emergent Wetland	narrow leaf cattail, aster, jewel weed, joe pye weed
ORFP-32	6/28/2012	-	-	-	-	-	top of berm defining study area boundary
ORFP-33	6/28/2012	-	-	-	-	-	revision to study area boundary at this location
ORFP-34	6/28/2012	-	20	20	Hand Auger	Floodplain Forest	silver maple, black walnut, choke cherry, dogwood, blackberry
ORFP-35	6/28/2012	-	10	10	Hand Auger	Floodplain Forest	willow, walnut, dogwood, reed canary grass, hickory
ORFP-36	6/28/2012	24	34	34	Hand Auger	Floodplain Field	reed canary grass, stinging nettle
ORFP-37	6/28/2012	11	33	32	Hand Auger and 3" Lexan	Emergent Wetland	narrow leaf cattail
ORFP-38	6/28/2012	-	-	-	Hand Auger and 3" Lexan	-	sandy bottom

Notes:

bgs - below ground surface

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Table A-5 - Reconnaissance Field Notes - Core Descriptions

Location ID	Date Processed	Core Top	Core Bottom	Core Units	Core Description
Sediment					
ORSED-01	6/25/2012	0	12	inches	grey brown clayey silt, slight odor, trace organics, degraded leaf/root material
ORSED-02	6/26/2012	0	12	inches	dark grey brown silty clay
		12	29	inches	dark grey silty clay
ORSED-04	6/26/2012	0	3	inches	fine sand
		3	23	inches	medium coarse sand
		23	27	inches	dark grey silty clay
		27	37	inches	fine sand, trace silt
ORSED-05	6/26/2012	0	4	inches	silty sand
		4	10	inches	grey silty clay, slight odor
		10	13	inches	grey silty clay, some sand
		13	16	inches	brown sandy clay
ORSED-06	6/26/2012	0	18	inches	medium coarse sand
		18	35	inches	grey silty clay
		35	36	inches	grey brown silty clay
ORSED-08	6/28/2012	0	2	inches	dark grey clayey silt, some fine sand
		2	17	inches	dark grey clayey silt, slight odor
ORSED-09	6/28/2012	0	9	inches	dark grey clayey silt, odor
		9	10	inches	dark grey clayey silt, odor, some fine gravel
ORSED-10	6/28/2012	0	10	inches	medium to coarse sand, some fine gravel, pebble
		10	22	inches	grey brown medium to coarse sand, trace silt, trace fine gravel
ORSED-11	6/28/2012	0	13	inches	dark grey medium to coarse sand, some silt, coal piece at 13"
		13	20	inches	dark grey fine to coarse sand
		20	22	inches	dark grey sandy silt, no odor
ORSED-12	6/28/2012	0	12	inches	brown fine sand, some silt
		12	18	inches	dark grey clayey silt, odor, sheen
		18	24	inches	brown clayey silt
		24	28	inches	silty sand
ORSED-13	6/28/2012	0	20	inches	grey brown sandy silt
		20	26	inches	dark grey clayey silt, some shells, degrading organics (leaves), moderate odor, sheen
		26	40	inches	brown sandy silt
ORSED-14	6/28/2012	0	9	inches	dark grey sandy silt
		9	17.5	inches	dark grey silty sand, trace organics (wood), moderate odor
		17.5	18	inches	grey clayey silt
ORSED-15	6/29/2012	0	2	inches	brown silty sand
		2	7	inches	grey brown silty sand, coarse material along bank
ORSED-16	6/29/2012	0	7	inches	grey brown silty sand
		7	17	inches	grey fine silty sand
		17	24	inches	dark grey silty sand

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Table A-5 - Reconnaissance Field Notes - Core Descriptions

Location ID	Date Processed	Core Top	Core Bottom	Core Units	Core Description
Sediment (Cont.)					
ORSED-17	6/29/2012	0	2	inches	grey brown silty sand
		2	10	inches	dark grey to black sandy silt, some organics
		10	14	inches	brown silty sand
		14	20	inches	dark grey to black clayey silt, some organics, no odor
ORSED-19	6/29/2012	0	6	inches	dark grey to black degrading organic materials, high silt content
		6	12	inches	dark grey to black silty sand
		12	18	inches	grey brown silty sand, some coarse sand to fine gravel
Floodplain Soil					
ORFP-01	6/26/2012	0	32	inches	sand, some gravel
ORFP-02	6/26/2012	0	27	inches	grey brown clay
		27	30	inches	orange brown sand
ORFP-03	6/26/2012	0	34	inches	dark grey clay (black)
		34	36	inches	sand
ORFP-04	6/26/2012	0	10	inches	grey organic silt with decaying organic matter
		10	42	inches	grey silt, odor
		42	57	inches	grey silt
ORFP-05	6/26/2012	0	20	inches	dark brown to black silty clay loam
		20	30	inches	light brown silty sand
ORFP-06	6/26/2012	0	8	inches	black silty clay
		8	30	inches	brown silty clay
		30	32	inches	tan clay
ORFP-07	6/26/2012	0	36	inches	black organic silt, moist
ORFP-08	6/26/2012	0	27	inches	grey brown clay loam
		27	42	inches	brown silty sand, moist
ORFP-09	6/26/2012	0	44	inches	grey brown clay loam
		44	78	inches	dark grey silty clay, odor
ORFP-10	6/26/2012	0	42	inches	grey brown clay loam
		42	55	inches	grey brown clay loam, slight odor
		55	56	inches	sand
ORFP-11	6/26/2012	0	2	inches	brown detritus
		2	42	inches	grey silty clay
		42	59	inches	dark grey silty clay, trace shells
ORFP-12	6/26/2012	0	47	inches	light grey silty clay
		47	60	inches	dark grey clayey silt, moderately decomposed organics
ORFP-13	6/27/2012	0	25	inches	grey clay loam
		25	45	inches	grey silty clay with some brown silty clay
		45	47	inches	grey silty clay
		47	55	inches	dark grey to black clayey silt, slight odor
		55	59	inches	grey clayey silt with some fine sand
		59	61	inches	grey silty fine sand

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Table A-5 - Reconnaissance Field Notes - Core Descriptions

Location ID	Date Processed	Core Top	Core Bottom	Core Units	Core Description
Floodplain Soil (Cont.)					
ORFP-14	6/27/2012	0	36	inches	grey brown clay loam, slight odor
		36	40	inches	grey clayey silt, no noticeable odor
		40	43	inches	grey clayey silt, some odor
		43	54	inches	dark grey clayey silt, slight odor
		54	56	inches	organic silt
ORFP-15	6/27/2012	0	23	inches	grey brown clay
		23	36	inches	brown silty medium sand
		36	40	inches	brown silty medium sand
		40	54	inches	grey brown silty sand, some gravel
		54	56	inches	multi color gravel, wood and gravel
		56	64	inches	brown silty sand
		64	66	inches	cobble
ORFP-16	6/27/2012	0	22	inches	grey clayey silt, slight odor
		22	35	inches	brown silty sand, no odor
		35	42	inches	dark grey sandy silt
		42	46	inches	dark grey silty sand
		46	58	inches	dark grey clayey silt, slight odor
		58	59	inches	dark grey sandy silt with more organics
		59	65	inches	dark grey sand silt
ORFP-17	6/27/2012	0	42	inches	brown silty clay, no odor
		42	45	inches	brown silty clay
		45	51	inches	grey brown silty clay, no odor
		51	52	inches	dark brown to black sandy silt, some small gravel
ORFP-18	6/27/2012	0	7	inches	grey silty clay, slight odor
		7	9	inches	sand lens, brown fine sand
		9	15	inches	grey silty clay, slight odor
		15	16	inches	sand lens, brown fine sand
		16	26	inches	grey silty clay
		26	30	inches	brown fine sand
		30	42	inches	brown sandy silt
		42	44	inches	brown clayey silt
		44	56	inches	brown sandy silt
ORFP-19	6/27/2012	0	24	inches	grey brown clayey silt
		24	45	inches	brown clayey silt, trace sand, trace organics (roots)
ORFP-20	6/27/2012	0	46	inches	brown clayey silt, slight odor, trace organics
		46	49	inches	brown clayey silt
		49	50	inches	brown sandy silt

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Attachment A - Data From Field Reconnaissance

Table A-5 - Reconnaissance Field Notes - Core Descriptions

Location ID	Date Processed	Core Top	Core Bottom	Core Units	Core Description
Floodplain Soil (Cont.)					
ORFP-21	6/27/2012	0	44	inches	grey silty clay, slight odor
		44	50	inches	dark grey clayey silt
		50	52	inches	dark brown clayey silt, some small gravel
ORFP-22	6/27/2012	0	8	inches	brown peat, lens of grey clayey silt at 8"
		8	33	inches	dark grey clayey silt, moderate odor
		33	39	inches	brown silty sand
ORFP-23	6/27/2012	0	20	inches	black to dark brown peat with some sand
		20	29	inches	brown small to medium gravel
		29	35	inches	grey sand and gravel
		35	43	inches	decaying organics, some fine gravel
		43	57	inches	grey silty sand, trace fine gravel
		57	65	inches	brown peat material
ORFP-24	6/28/2012	0	16	inches	brown clayey silt, trace organics (roots)
		16	20	inches	brown sandy silt
		20	27	inches	brown clayey silt, trace organics
		27	33	inches	grey to brown clayey silt, some brown sandy silt
		33	40	inches	grey to brown sandy silt, some gravel
ORFP-25	6/28/2012	0	19	inches	dark brown clayey silt (dry)
		19	24	inches	brown silty sand
		24	30	inches	some gravel with depth
ORFP-26	6/28/2012	0	37	inches	dark brown peat material, some clayey silt
		37	43	inches	dark brown peat
		43	45	inches	brown clayey silt
		45	48	inches	grey sandy silt
ORFP-27	6/28/2012	0	23	inches	grey silty clay
		23	35	inches	dark brown peat
		35	40	inches	dark brown peat
		40	42	inches	brown clayey silt
		42	51	inches	grey silty sand with some gravel, trace shell fragments
ORFP-28	6/28/2012	0	23	inches	grey clayey silt intermixed with peat
		23	30	inches	brown peat
		30	43	inches	brown silty sand
ORFP-29	6/28/2012	0	28	inches	grey brown silty clay, some organics, pockets of brown sand, no odor
		28	43	inches	grey brown sandy silt
		43	45	inches	very fine sand
		45	50	inches	brown clayey silt
		50	52	inches	brown decaying organic matter (wood)

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Attachment A - Data From Field Reconnaissance

Table A-5 - Reconnaissance Field Notes - Core Descriptions

Location ID	Date Processed	Core Top	Core Bottom	Core Units	Core Description
Floodplain Soil (Cont.)					
ORFP-31	6/28/2012	0	13	inches	grey brown clayey silt
		13	29	inches	grey clayey silt
		29	43	inches	dark grey to black clayey silt, trace sand
ORFP-34	6/28/2012	0	14	inches	brown very fine sand, some gravel, some cobble
		14	20	inches	changing to light brown very fine to medium sand, some gravel
ORFP-35	6/28/2012	0	10	inches	brown very fine sand, cobble below
ORFP-36	6/28/2012	0	3	inches	grey brown clayey silt, some root matter
		3	8	inches	grey clayey silt with slight odor and some root material
		8	13	inches	brown fine to coarse sand
		13	18	inches	grey clayey silt, no odor
		18	29	inches	grey brown sandy silt
		29	34	inches	grey brown clayey silt, some sand, some fine to medium gravel
ORFP-37	6/28/2012	0	13	inches	grey brown peat with some clayey silt, no odor
		13	19	inches	grey clayey silt, slight odor
		19	23	inches	grey clayey silt with silty sand and fine to medium gravel
		23	29	inches	grey clayey silt, slight odor
		29	32	inches	grey brown sandy silt with fine to coarse gravel
Pine Creek Sediment					
OSED-01	7/12/2012	0	8	inches	Dark brown black sandy silt, trace organics (rootlets, leaves)
		8	16	inches	Grey brown fine sand, some organics (rootlets, twigs)
		16	24	inches	Dark brown black sandy silt, trace organics (rootlets, shells), odor
		24	42	inches	Grey brown very fine to medium sand, little silt, trace organics (roots, leaves)
OSED-02	7/12/2012	0	4	inches	Dark brown black silty fine sand, little organics (roots, leaves, shells, grass)
		4	8	inches	Grey brown sandy silt, trace organics (shells, root)
		8	16	inches	Grey brown silty clay, little fine sand, trace organics (shells, rootlets)
		16	42	inches	Tan grading to grey very fine to medium sand, little organics (leaves, roots, twigs)
OSED-03	7/12/2012	0	6	inches	Dark grey brown silt, trace fine sand, some organics (rootlets, shells, leaves)
		6	12	inches	Dark grey silt, trace organics (shells, rootlets), odor
		12	42.5	inches	Dark grey black silt, trace fine to coarse sand, trace cobble, trace organics (roots, shells), trace wood, 1" grey seam of fine to coarse sand at 34-35"
OSED-04	7/12/2012	0	12	inches	Dark brown black silty sand with organics (roots, leaves, grass)
		12	19	inches	Dark grey brown silt, trace fine sand, odor, trace organics (roots)
		19	34.5	inches	Dark greyish brown silt, trace fine sand, little organics (wood, leaves, roots)
		34.5	48	inches	Light grey brown very fine to coarse sand, trace wood and roots, trace shells
OSED-05	7/12/2012	0	12	inches	Dark brown black silt with fine sand and organics (leaves, roots, rootlets)
		12	15	inches	Grey brown silt, trace fine sand, little organics (rootlets), odor
		15	26	inches	Dark grey silt, trace organics (rootlets), odor
		26	36	inches	Dark brown silty clay, trace silt, trace organics (rootlets)

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Attachment A - Data From Field Reconnaissance

Table A-5 - Reconnaissance Field Notes - Core Descriptions

Location ID	Date Processed	Core Top	Core Bottom	Core Units	Core Description
Pine Creek Sediment (Cont.)					
OSD-06	7/12/2012	0	11	inches	Dark brown black silt to fine sand, some organics (shells, roots, leaves)
		11	15	inches	Dark grey silt, trace clay, trace organics (rootlets, leaves), odor
		15	31	inches	Dark brown silt, some fine to coarse sand, trace clay, trace organics (rootlets, leaves), odor
OSD-07	7/12/2012	0	8	inches	Olive grey grading to dark grey silty clay, trace organics (roots, rootlets, shells)
		8	12	inches	Dark brown silt, trace clay, odor, trace organics (roots, shells)
		12	18	inches	Dark brown to black silt, trace fine sand, odor, trace organics (roots, shells)
		18	24	inches	Dark brown silt, some fine sand, trace organics (roots, shells)
OSD-08	7/12/2012	0	10	inches	Olive grey clay with silt, little organics (roots, rootlets, shells)
		10	22	inches	Dark grey brown mottled with black silt, little clay, trace organics (shells, rootlets)
		22	25.5	inches	Grey brown silt, trace fine sand, trace organics (shells, roots)
		25.5	29	inches	Red brown silt with organics (roots, rootlets), odor
		29	41	inches	Light brown silt, some clay, little fine to coarse sand, trace organics (shells, wood, roots)
OSD-09	7/12/2012	0	6	inches	Reddish brown clay with silt, little organics (shells, roots, wood, leaves)
		6	10	inches	Black silt, some organics (leaves, wood, roots)
		10	17	inches	Grey brown silt, trace clay, trace fine sand, trace organics (wood, leaves, shells, roots)
		17	22	inches	Brown clayey silt, trace organics (shells)
		22	31	inches	Dark reddish brown fine to coarse sand, trace clay, trace organics (roots)
OSD-10	7/12/2012	0	12	inches	Dark brown silt, little clay, trace fine sand, trace organics (roots)
		12	14.5	inches	Grey very fine to very coarse sand, trace organics (shells)
		14.5	18	inches	Dark brown black silt, little fine to medium sand, odor
		18	23	inches	Dark brown very fine to coarse sand, trace organics (wood, shells)
		23	26	inches	Dark brown to black silt, little fine sand
		26	30	inches	Dark grey brown grading to light grey brown very fine sand, trace organics (leaves)

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Attachment A - Data From Field Reconnaissance

Table A-6 - Pine Creek Sediment Samples collected during Reconnaissance

Location ID	Sample Interval (inches)	Sample ID	Sample Date	Duplicated Sample ID	MS/MSD	Analysis ^{1, 2}	Status
OSED-01	0 - 2	K57622	7/12/2012			PCB, TOC	Archived
	2 - 6	K57623	7/12/2012			PCB, PCDD/PCDF	Archived
	6 - 8	K57624	7/12/2012			PCB	Archived
	8 - 12	K57625	7/12/2012			PCB, PCDD/PCDF	Archived
	12 - 24	K57626	7/12/2012			PCB, SVOCs/Pesticides/Metals, PCDD/PCDF	Archived
	24 - 36	K57627	7/12/2012			PCB, SVOCs/Pesticides/Metals, PCDD/PCDF	Archived
OSED-02	36 - 42	K57628	7/12/2012			PCB, SVOCs/Pesticides/Metals, PCDD/PCDF	Archived
	0 - 2	K57629	7/12/2012			PCB, TOC	Archived
	2 - 6	K57630	7/12/2012			PCB, PCDD/PCDF	Archived
	6 - 12	K57631	7/12/2012			PCB, SVOCs/Pesticides/Metals, PCDD/PCDF	Archived
	12 - 16	K57632	7/12/2012			PCB, SVOCs/Pesticides/Metals, PCDD/PCDF	Archived
	16 - 24	K57633	7/12/2012			PCB, SVOCs/Pesticides/Metals, PCDD/PCDF	Archived
OSED-03	24 - 36	K57634	7/12/2012			PCB, SVOCs/Pesticides/Metals, PCDD/PCDF	Archived
	36 - 42	K57635	7/12/2012			PCB, SVOCs/Pesticides/Metals, PCDD/PCDF	Archived
	0 - 2	K57636	7/12/2012			PCB, TOC	Archived
	2 - 6	K57637	7/12/2012			PCB, PCDD/PCDF	Archived
	6 - 12	K57638	7/12/2012			PCB, SVOCs/Pesticides/Metals, PCDD/PCDF	Archived
	12 - 24	K57639	7/12/2012			PCB, SVOCs/Pesticides/Metals, PCDD/PCDF	Archived
OSED-04	24 - 36	K57640	7/12/2012			PCB, SVOCs/Pesticides/Metals, PCDD/PCDF	Archived
	36 - 42.5	K57641	7/12/2012			PCB, SVOCs/Pesticides/Metals, PCDD/PCDF	Archived
	0 - 2	K57642	7/12/2012			PCB, TOC	Archived
	2 - 6	K57643	7/12/2012			PCB, PCDD/PCDF	Archived
	6 - 12	K57644	7/12/2012			PCB, SVOCs/Pesticides/Metals, PCDD/PCDF	Archived
	12 - 19	K57645	7/12/2012			PCB, SVOCs/Pesticides/Metals, PCDD/PCDF	Archived
OSED-05	19 - 24	K57646	7/12/2012			PCB, SVOCs/Pesticides/Metals, PCDD/PCDF	Archived
	24 - 36	K57647	7/12/2012			PCB, SVOCs/Pesticides/Metals, PCDD/PCDF	Archived
	36 - 48	K57648	7/12/2012			PCB, SVOCs/Pesticides/Metals, PCDD/PCDF	Archived
	0 - 2	K57649	7/12/2012			PCB, TOC	Archived
	2 - 6	K57650	7/12/2012			PCB, PCDD/PCDF	Archived
	6 - 12	K57651	7/12/2012			PCB, PCDD/PCDF	Archived
OSED-06	12 - 15	K57652	7/12/2012			PCB, PCDD/PCDF	Archived
	15 - 24	K57653	7/12/2012			PCB, SVOCs/Pesticides/Metals, PCDD/PCDF	Archived
	15 - 24	K57654	7/12/2012	K57653		PCB, PCDD/PCDF	Archived
	24 - 36	K57655	7/12/2012			PCB, SVOCs/Pesticides/Metals, PCDD/PCDF	Archived
	0 - 2	K57656	7/12/2012			PCB, TOC	Archived
	2 - 6	K57657	7/12/2012			PCB, PCDD/PCDF	Archived
OSED-07	6 - 11	K57658	7/12/2012			PCB, PCDD/PCDF	Archived
	11 - 15	K57659	7/12/2012			PCB, PCDD/PCDF	Archived
	15 - 24	K57660	7/12/2012		X	PCB, PCDD/PCDF	Archived
	24 - 31	K57661	7/12/2012			PCB, SVOCs/Pesticides/Metals, PCDD/PCDF	Archived
	0 - 2	K57662	7/12/2012			PCB, TOC	Archived
	2 - 6	K57663	7/12/2012			PCB, PCDD/PCDF	Archived
OSED-08	6 - 8	K57664	7/12/2012			PCB, PCDD/PCDF	Archived
	8 - 12	K57665	7/12/2012			PCB, PCDD/PCDF	Archived
	12 - 24	K57666	7/12/2012			PCB, SVOCs/Pesticides/Metals, PCDD/PCDF	Archived
	12 - 24	K57667	7/12/2012	K57666		PCB	Archived
	0 - 2	K57668	7/12/2012			PCB, TOC	Archived
	2 - 6	K57669	7/12/2012			PCB, PCDD/PCDF	Archived
OSED-09	6 - 10	K57670	7/12/2012			PCB, PCDD/PCDF	Archived
	10 - 12	K57671	7/12/2012			PCB, PCDD/PCDF	Archived
	12 - 22	K57672	7/12/2012			PCB, SVOCs/Pesticides/Metals, PCDD/PCDF	Archived
	22 - 25.5	K57673	7/12/2012			PCB, PCDD/PCDF	Archived
	25.5 - 29	K57674	7/12/2012			PCB, PCDD/PCDF	Archived
	29 - 41	K57675	7/12/2012			PCB, SVOCs/Pesticides/Metals, PCDD/PCDF	Archived
OSED-09	29 - 41	K57676	7/12/2012	K57675		PCB, SVOCs/Pesticides/Metals, PCDD/PCDF	Archived
	0 - 2	K57677	7/12/2012			PCB, TOC	Archived
	2 - 6	K57678	7/12/2012			PCB, PCDD/PCDF	Archived
	6 - 10	K57679	7/12/2012			PCB, PCDD/PCDF	Archived
	10 - 22	K57680	7/12/2012		X	PCB, SVOCs/Pesticides/Metals, PCDD/PCDF	Archived
	22 - 31	K57681	7/12/2012			PCB, SVOCs/Pesticides/Metals, PCDD/PCDF	Archived

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Attachment A - Data From Field Reconnaissance

Table A-6 - Pine Creek Sediment Samples collected during Reconnaissance

Location ID	Sample Interval (inches)	Sample ID	Sample Date	Duplicated Sample ID	MS/MSD	Analysis ^{1, 2}	Status
OSED-10	0 - 2	K57682	7/12/2012			PCB, TOC	Archived
	2 - 6	K57683	7/12/2012			PCB, PCDD/PCDF	Archived
	6 - 12	K57684	7/12/2012			PCB, SVOCs/Pesticides/Metals, PCDD/PCDF	Archived
	12 - 15	K57685	7/12/2012			PCB	Archived
	15 - 18	K57686	7/12/2012			PCB, PCDD/PCDF	Archived
	18 - 23	K57687	7/12/2012			PCB, SVOCs/Pesticides/Metals, PCDD/PCDF	Archived
	23 - 30	K57688	7/12/2012		X - PCB and PCDD/PCDF	PCB, SVOCs/Pesticides/Metals, PCDD/PCDF	Archived

Notes:

1. Non-PCB analyses were identified depending on the volume of material available in the sample depth interval. Non-PCB analysis will be performed on selected samples based on the results of the PCB analysis.
2. Selected samples will be submitted only for PCB analysis.

☐ Location selected for PCB analysis

MS/MSD = Matrix Spike/Matrix Spike Duplicate

PCB = polychlorinated biphenyls

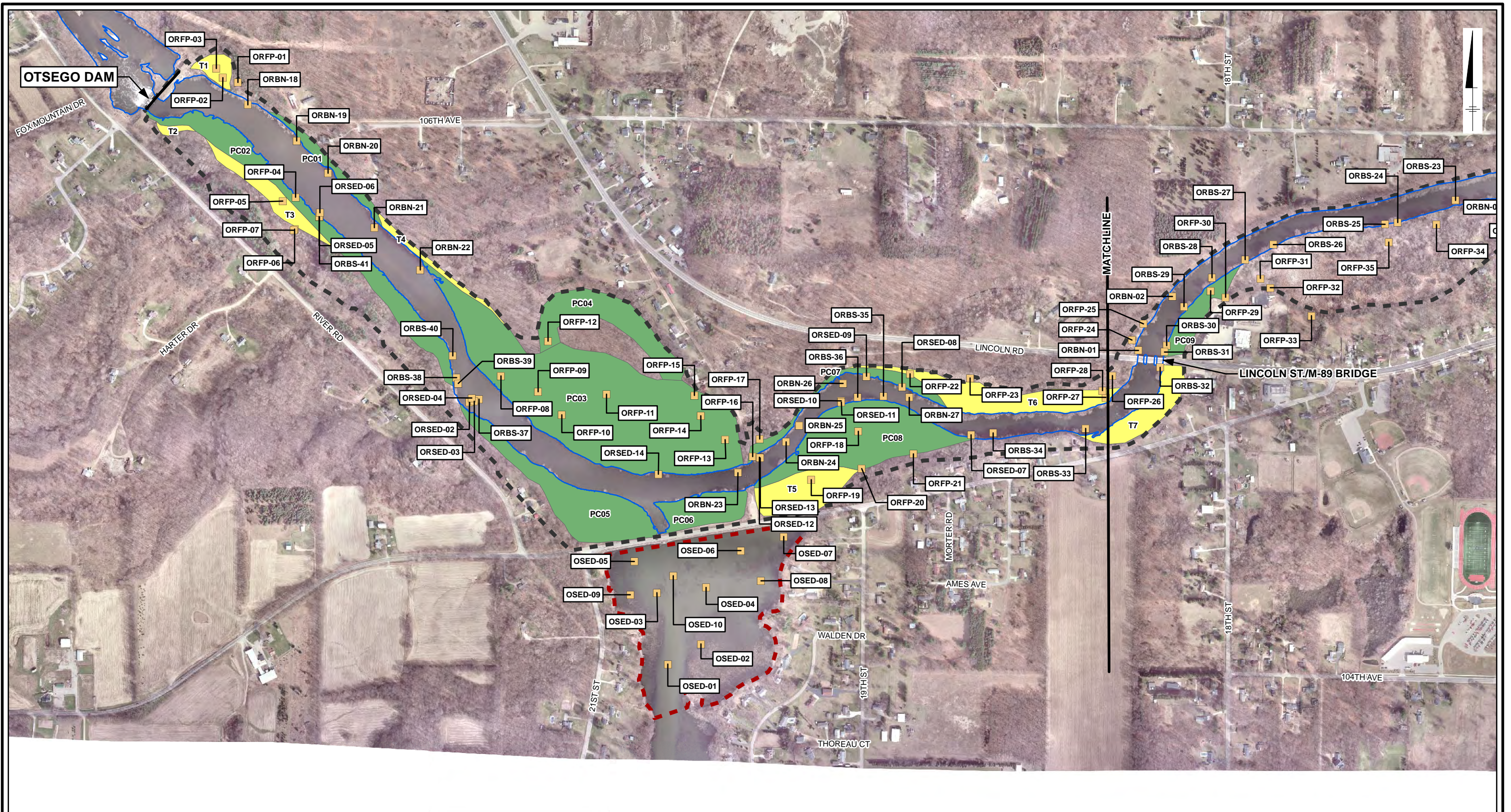
PCDD/PCDF = polychlorinated dibenzo-p-dioxin/polychlorinated dibenzofuran

SVOC = semivolatile organic compound

TOC = total organic carbon

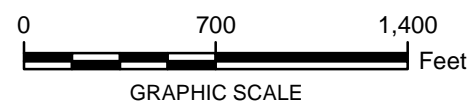
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LEGEND:

- GPS SURVEY POINT
- CURRENT SHORELINE
- APPROXIMATE AREA 3 STUDY AREA BOUNDARY
- APPROXIMATE PINE CREEK STUDY AREA BOUNDARY
- PREVIOUS CHANNEL
- TERRACE



NOTE:

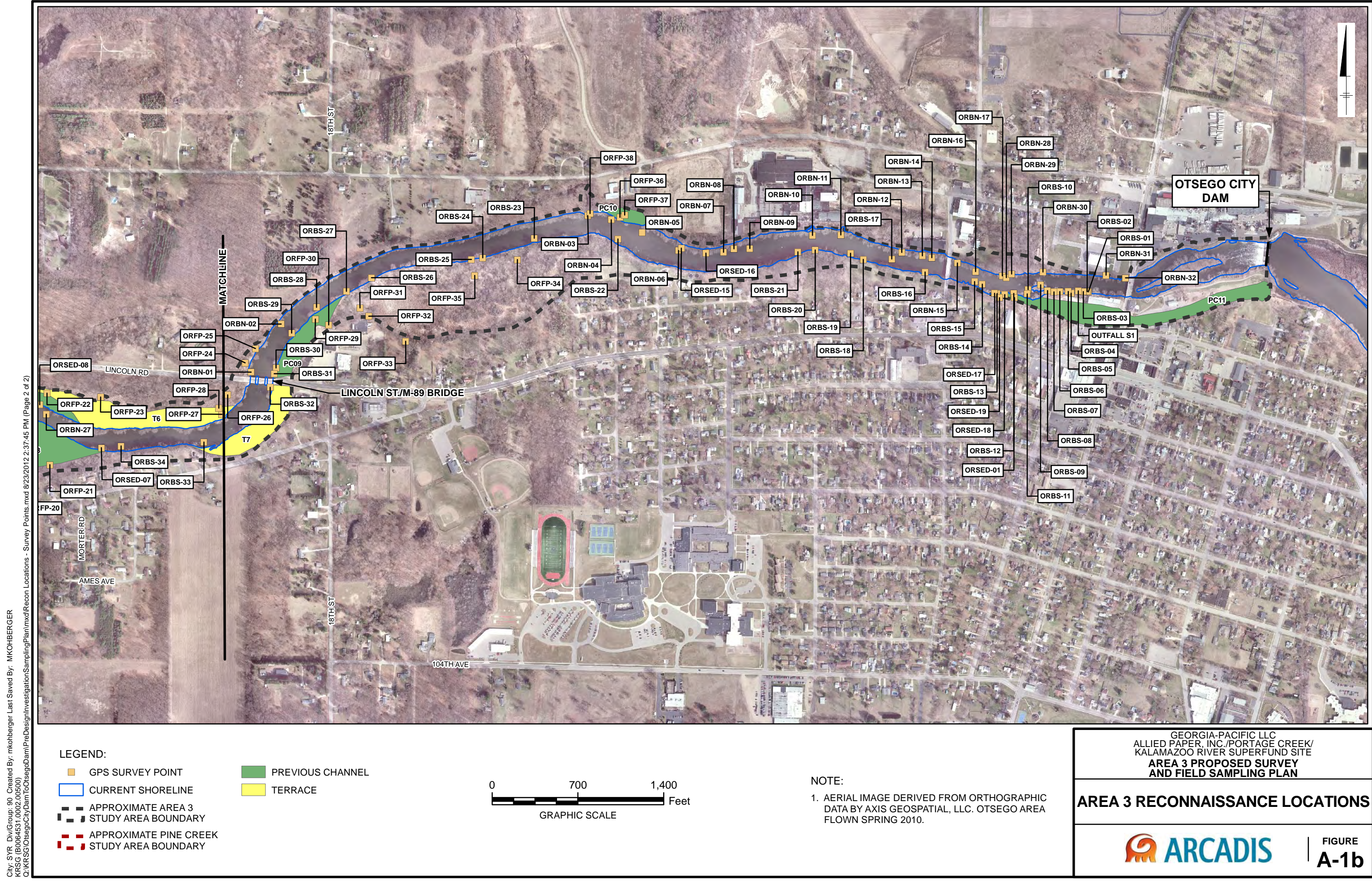
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GEORGIA-PACIFIC LLC
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**AREA 3 PROPOSED SURVEY
AND FIELD SAMPLING PLAN**

AREA 3 RECONNAISSANCE LOCATIONS



FIGURE
A-1a



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LEGEND:

- CURRENT SHORELINE
- APPROXIMATE AREA 3 STUDY AREA BOUNDARY
- APPROXIMATE PINE CREEK STUDY AREA BOUNDARY

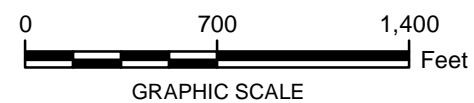
- PREVIOUS CHANNEL
- TERRACE

BANK TYPE:

- | | | |
|-------|---|-----------|
| A | E | K |
| A & B | F | L |
| B | G | M |
| C | H | N |
| D | I | NA |
| | J | SHEETPILE |

NOTE:

- AERIAL IMAGE DERIVED FROM ORTHOGRAPHIC DATA BY AXIS GEOSPATIAL, LLC. OTSEGO AREA FLOWN SPRING 2010.



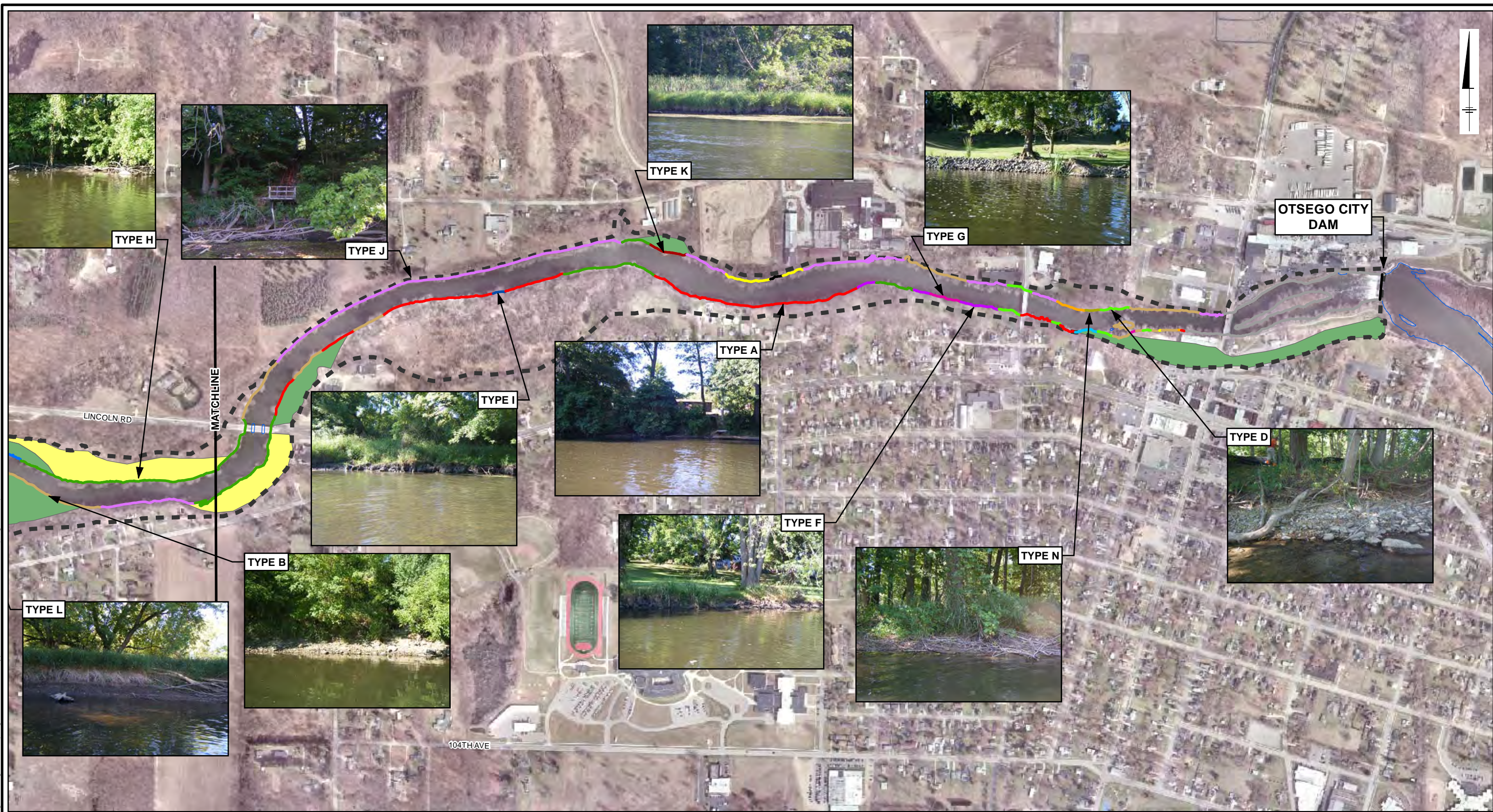
GEORGIA-PACIFIC LLC
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**AREA 3 PROPOSED SURVEY
AND FIELD SAMPLING PLAN**

**AREA 3 RECONNAISSANCE
BANK TYPES**



FIGURE
A-2a

City: SYR Div/Group: 90 Created By: mikoberger Last Saved By: MKOBERGER
KRSR (B0064531.0002.00500)
C:\KRSR\OsegoCityDam\PreDesignInvestigation\SamplingPlan.mxd (Page 2 of 2)



LEGEND:

- CURRENT SHORELINE
- APPROXIMATE AREA 3 STUDY AREA BOUNDARY
- APPROXIMATE PINE CREEK STUDY AREA BOUNDARY

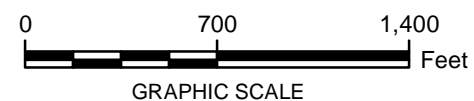
- PREVIOUS CHANNEL
- TERRACE

BANK TYPE:

- | | | |
|-------|---|-----------|
| A | E | K |
| A & B | F | L |
| B | G | M |
| C | H | N |
| D | I | NA |
| | J | SHEETPILE |

NOTE:

- AERIAL IMAGE DERIVED FROM ORTHOGRAPHIC DATA BY AXIS GEOSPATIAL, LLC. OTSEGO AREA FLOWN SPRING 2010.



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**AREA 3 PROPOSED SURVEY
AND FIELD SAMPLING PLAN**

**AREA 3 RECONNAISSANCE
BANK TYPES**



FIGURE
A-2b

City: SYR Div/Group: 90 Created By: Sruti Pulugurtha Last Saved By: MKOHBERGER
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